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# Results of a Vegetation Geochemical Survey near Bissett, Southeastern Manitoba

By M.A.F. Fedikow

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Energy and Mines

Hon. Wilson D. Parasiuk
Minister

Charles S. Kang
Deputy Minister

Minerals Division

Sobraham Singh
Assistant Deputy Minister

Geological Services
W. David McRitchie
Director

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## INTRODUCTION

The Bissett area of southeastern Manitoba (Fig. 1) is located in the Archean Rice Lake greenstone belt. It has a long history of exploration and mining activity focussed on gold-bearing quartz veins and vein systems. The largest deposit that resulted from the exploration, mining and development efforts, to date, was the San Antonio gold mine. This quartz vein-type deposit, operated primarily between 1932 and 1968, recovered 37320 kg of gold and 5778 kg of silver; the average grade of gold was 9.2 g/tonne. In addition to the San Antonio deposit numerous other gold deposits in various geologic settings have been documented in the area (Stockwell, 1938). Most recently, a detailed geological data base for the Rice Lake greenstone belt has been compiled by the mineral deposits group of the Manitoba Mines Branch (Stewart, 1985; Gaba and Theyer, 1984; Schmidtke, 1984). This data base comprises detailed geological mapping and geochemical sampling and is intended to provide explorationists with additional geological information regarding known mineral occurrences and environments of deposition.

As part of mineral deposit programs in the Rice Lake greenstone belt an examination of geochemical exploration techniques, in addition to the acquisition of basic geologic information, has been initiated. The testing and development of vegetation geochemical exploration techniques in the Bissett area commenced in 1985 when Mr. Steve LeSavage collected samples of black spruce (*Picea mariana*) and dwarf birch (*Betula glandulosa*) from a small study area east of Bissett. Samples were collected during the month of January from an area of frozen peat bog. The survey was undertaken in an attempt to define vegetation geochemical anomalies related to a suspected zone or zones of mineralization overlain by a surficial deposit of peat bog.

In this report the trace element response of black spruce needles, twigs and bark and dwarf birch twigs to the substrate is examined. A comparison of Au and As analyses in ashed and unashed samples is presented along with a comparison of vegetation geochemical response and VLF-EM results. Baseline data for trace element abundances in ashed dwarf birch twigs is presented.

## GEOLOGY

The geology of this vegetation geochemical study area is given in Figure 1. Geological mapping in the general area of Bissett was undertaken by the Manitoba Mines Branch from 1966 to 1969 as part of Project Pioneer - a geological, geophysical and geochemical survey of southeastern Manitoba (McRitchie and Weber, 1971). Underlying the study area are volcanic and sedimentary rocks of the Archean Rice Lake Group. The volcanic rocks comprise basalt, basalt breccia, dacitic to rhyodacitic volcanic breccia and tuff breccia. Sedimentary rocks are characterized by volcaniclastic grits with lenses of conglomerate, limestone, and oxide facies iron formation. These volcano-sedimentary sequences are intruded by gabbro and coarse grained biotite trondhjemite. South of the study area a major east-trending fault has been delineated; the nature of and offset along the fault have not been determined.

The study area is located approximately 6 km southeast of the Jeep gold mine. This deposit produced 1555 kg of gold from 133 686 tonnes milled in 1942 at a grade of 37.72 g/tonne and between 1948 and 1951 at a grade of 11.66 g/tonne. Gold, with associated pyrite and arsenopyrite, occurred in quartz-filled shear zones within hornblende diorite. Underlying the vegetation geochemical sampling transect are clastic and chemical sedimentary rocks of the Edmunds Lake Formation, Rice Lake Group. The clastic sedimentary rocks comprise greywacke, argillite and grit; chemical sedimentary rocks include oxide facies chert-magnetite iron formation and carbonate lenses.

Figure 1: Location map and general geology of the sampling area. Geology after Weber, 1971.

## SAMPLE COLLECTION

A total of 42 samples of black spruce and dwarf birch organs were collected from a single transect over a 600 $m^2$ frozen bog in January, 1985. During the summer months the bog is characterized by ponded waters overlying organic-rich mud and variably decomposed vegetation. The nature of the overburden beneath the bog is unknown. In addition to the black spruce and the dwarf birch other predominant vegetation types and their abundance in the bog include: (1) alder (*Alnus crispa*) - abundant at the edge of the bog to non-existent in the centre; (2) tamarack (*Larix laricina*) - sporadic at the centre of the bog to non-existent at the edges; and (3) labrador tea (*Ledum groenlandicum*) - abundant throughout. Black spruce is found throughout the bog but tall trees at the edges of the bog become shorter and less vigorous in the wettest portions of the swamp. Dwarf birch is consistent in terms of vigour and density throughout the swamp.

Black spruce samples consisted of twigs (n = 13), needles (n = 13) and the outer scaly bark (n = 13); dwarf birch twigs (n = 13) were the only organ of this species that was collected. The black spruce trees that were sampled had a minimum trunk diameter of 13 cm; bark samples were collected from 20 cm of bark completely around the tree trunk consistently at 1 m above ground level. Dwarf birch samples consist of a representative number of twigs 20 to 25 cm long collected from each bush. At each sampling site black spruce and dwarf birch samples were collected from each tree within a 5 metre square area and bulked to give a needle or twig or bark composite sample deemed to represent the species sampled within the sampling 'box'. Sampling sites along the transect were approximately 50 m apart.

## SAMPLE PREPARATION AND ANALYSIS

The black spruce needles, twigs and bark and the dwarf birch twigs were macerated to -20 mesh using a Wiley mill prior to determination of Co, Cr, Cu, Fe, Mn, Ni, Pb, Zn, Ba and Au in ash using atomic absorption spectrophotometry (AAS). The macerated sample was homogenized and a representative split of 20 g (30 g for Au) was ashed in a muffle furnace at 450$^{o}$C. A fixed weight of ash (0.250 g) was dissolved using a hot hydrochloric:nitric acid digestion in the proportion $HCl:HNO_3$ = 1:3. The analyses were undertaken by Bondar-Clegg Ltd. (Ottawa). The instrumental neutron activation analyses (INAA) of Au and As were also conducted by Bondar-Clegg Ltd. on 20 g briquettes of macerated needles, twigs or bark. The lower limits of detection for each element determined in this study are Au (0.1 ppb), As (0.1 ppm), Ni-Cr-Pb (2 ppm) and Co-Cu-Fe-Mn-Zn-Ba (1 ppm). Analytical reproducibility for all elements was consistently within 5 to 10%. The elements Ba and As were not analyzed in black spruce samples. Analytical specifications and raw analytical data are presented in Appendices I and II, respectively. Histograms for the vegetation geochemical data are given in Appendix III.

## RESULTS

### Au and As Analyses in Ashed vs. Unashed Material in Vegetation Geochemical Surveys

During the course of a vegetation geochemical survey for Au the sampled materials will invariably be analyzed for Au at one stage or another. Currently, gold in vegetation may be analyzed either by atomic absorption spectrophotometry (AAS) after wet or dry ashing or by instrumental neutron activation analysis (INAA). The AAS dry ashing technique involves ashing a fixed amount of sample in a muffle furnace at a fixed temperature (450$^{o}$C) after a series of temperature increases. Depending on the nature of Au compounds in the sample being ashed (cyanogenic?) quantities of gold may be lost to volatilization during ashing. To avoid this loss the non-destructive technique of INAA may be used and allows the determination of low level ppb Au in the sample. In this study the AAS analytical results for Au and As concentrations in ashed and unashed samples are compared and contrasted.

A comparison of the Au analyses in ashed and unashed black spruce needles, twigs and bark is presented in Table 1; ashed and unashed results for dwarf birch twig analyses are presented in Table 2. In the black spruce samples a majority of the 13 samples of each organ showed an increase in Au concentration after ashing. In black spruce needles 10 of 13 samples increased in Au content with 2 samples showing no change and one sample decreasing. Six of the samples with no detectable gold when analyzed in the unashed or raw state contained measurable gold after ashing. In black spruce twigs 12 of 13 samples increased in Au content by a maximum factor of 3 after ashing with one sample decreasing. In black spruce bark 8 of 13 samples increased in gold content after ashing. Dwarf birch twigs demonstrate a marked increase in Au contents with increases in ashed equivalents of up to a factor of 10 in each of 13 samples. Equally impressive are the increased As contents in the ashed sample. Each of the 13 samples indicates at least one order of magnitude difference between ashed and unashed counterparts

There can be no doubt that the Au and As contents in these vegetation geochemical samples are significantly elevated as a result of sample ashing. The samples indicating a decrease or no change in Au content suggest

non-reproducibility in the analytical technique, probably as a result of either instrument error, sample inhomogeneity or volatilization. Volatilization of Au (and As) remains a problem when vegetation geochemical samples are ashed unless the species is non-cyanogenic and Au is not present as a gold-cyanide complex. Analyses should be monitored by the use of a standard ash or replicate ashes to ensure analytical variability does not obscure bona fide trends in the data.

## Data Distribution

Variable distributions are obtained for vegetation geochemical data in this study. Black spruce needles have a generally restricted range of values for Cu, Pb, Fe, Zn and Au (unashed sample) where distribitions for Mn, As and Au (ashed sample) more closely approximate lognormality. Black spruce twigs are characterized by positively skewed distributions for Cu and Au (ashed and unashed sample) with the remainder of the elements having restricted "normal" distributions. The elements Pb, Cr and Au (ashed and unashed sample) have skewed distributions in black spruce bark samples. Dwarf birch geochemical data have skewed distributions for Fe, Co, Cr, Au and As (ashed sample). The common element in each of the skewed distributions for the organs analyzed in this study is Au. Inasmuch as skewed data distributions indicate a multiple population within the data set, then it is presumed that two or more populations for Au are present. A further presumption would be that the multiple data populations for Au represent a background and anomalous population. Unfortunately, the scattered nature of the Au contents in vegetation samples along the transect precludes a definitive interpretation as to the presence of a set of samples containing anomalous Au concentrations, i.e. a bone fide Au anomaly. Furthermore, the small number of samples used in the survey (n = 13) indicates the need for caution in this interpretation.

TABLE 1

COMPARISON OF GOLD ANALYSES IN ASHED (AAS) AND UNASHED (INAA) BLACK SPRUCE NEEDLES (N), TWIGS (T) AND BARK (B)

| Sample Number | Au (unashed; INAA: ppb) | Au (ashed; AAS; ppb) |
|---|---|---|
| 85-1 N | n.d. | 0.2 |
| T | 0.9 | 1.8 |
| B | 0.9 | 0.6 |
| 85-2 N | n.d. | 0.2 |
| T | 1.6 | 0.7 |
| B | 1.1 | 0.9 |
| 85-3 N | 0.3 | 0.3 |
| T | 0.6 | 0.9 |
| B | 0.5 | 0.9 |
| 85-4 N | 0.7 | 0.3 |
| T | n.d. | 0.6 |
| B | 0.5 | 0.6 |
| 85-5 N | n.d. | 0.2 |
| T | 0.7 | 0.8 |
| B | 0.3 | 0.6 |
| 85-6 N | n.d. | 0.3 |
| T | 0.9 | 1.0 |
| B | 0.2 | 0.6 |
| 85-7 N | n.d. | 1.4 |
| T | 0.2 | 0.4 |
| B | 0.5 | 0.6 |
| 85-8 N | n.d. | 0.6 |
| T | n.d. | 0.7 |
| B | 0.3 | 0.5 |
| 85-9 N | 0.3 | 0.3 |
| T | n.d. | 0.8 |
| B | 0.2 | 0.4 |
| 85-10 N | 0.2 | 0.3 |
| T | 0.5 | 0.9 |
| B | 0.4 | 0.5 |
| 85-11 N | 0.3 | 0.4 |
| T | n.d. | 0.3 |
| B | 0.3 | 0.3 |
| 85-12 N | 0.4 | 0.5 |
| T | 0.3 | 1.0 |
| B | 0.5 | 0.3 |
| 85-13 N | 0.3 | 0.7 |
| T | 1.0 | 1.5 |
| B | 0.2 | 0.2 |

The designation "n.d." indicates the concentration of the element was found to be below the limits of detection.

TABLE 2

ANALYTICAL DATA FROM THE ANALYSIS OF DWARF BIRCH TWIGS BY AAS
AFTER ASHING AND BY INAA IN UNASHED SAMPLE FOR AU AND AS ONLY

| Sample Number | Au (ppb) Raw | Au (ppb) | As (ppm) Raw | As (ppm) | Cr (ppm) | Mn (ppm) | Fe (ppm) | Co (ppm) | Ni (ppm) | Cu (ppm) | Zn (ppm) | Ba (ppm) | Pb (ppm) | Ash (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DB85- 1(ASH) | 1.3 | 87 | 0.1 | 6.9 | 41 | 7730 | 6378 | 3 | 10 | 84 | 8649 | 2373 | 68 | 1.85 |
| DB85- 2(ASH) | 1.4 | 63 | 0.2 | 4.6 | 29 | 8333 | 6389 | 7 | 10 | 65 | 6870 | 2222 | 59 | 2.16 |
| DB85- 3(ASH) | 1.0 | 69 | 0.1 | 3.0 | 21 | 7143 | 5491 | 2 | 8 | 79 | 7116 | 1808 | 50 | 2.24 |
| DB85- 4(ASH) | 1.4 | 59 | 0.1 | 3.4 | 16 | 4880 | 4520 | 6 | 7 | 65 | 7248 | 2184 | 36 | 2.50 |
| DB85- 5(ASH) | 0.7 | 17 | 0.1 | 2.5 | 9 | 3735 | 2759 | 7 | 2 | 50 | 5801 | 1729 | 29 | 3.32 |
| DB85- 6(ASH) | 0.9 | 27 | 0.1 | 2.5 | 13 | 5578 | 3307 | 3 | 4 | 67 | 10200 | 1761 | 39 | 2.51 |
| DB85- 7(ASH) | 0.9 | 36 | 0.1 | 3.7 | 18 | 9689 | 3689 | 5 | 8 | 73 | 9573 | 1978 | 43 | 2.25 |
| DB85- 8(ASH) | 5.6 | 69 | 0.1 | 5.8 | 17 | 8676 | 120000 | 3 | 4 | 80 | 11460 | 1583 | 48 | 2.04 |
| DB85- 9(ASH) | 0.5 | 18 | 0.1 | 4.1 | 14 | 10910 | 3696 | 3 | 2 | 96 | 11960 | 1957 | 50 | 2.30 |
| DB85-10(ASH) | 0.5 | 30 | 0.1 | 6.3 | 13 | 10438 | 3577 | 3 | 9 | 79 | 10340 | 2259 | 75 | 2.74 |
| DB85-11(ASH) | 1.0 | 110 | 0.1 | 5.6 | 16 | 12830 | 5373 | 4 | 10 | 101 | 12080 | 2547 | 69 | 2.01 |
| DB85-12(ASH) | 0.3 | 26 | 0.1 | 5.1 | 17 | 9400 | 4292 | 8 | 6 | 81 | 10910 | 2262 | 68 | 2.33 |
| DB85-13(ASH) | 0.7 | 26 | 0.1 | 3.5 | 14 | 9752 | 4604 | 15 | 12 | 89 | 9376 | 1485 | 69 | 2.02 |

**Relative elemental abundances in black spruce (*Picea mariana*) needles, twigs and bark and dwarf birch (*Betula glandulosa*) twigs**

Relative abundances of the elements examined in vegetation samples for this study are summarized in Table 3. Although only 13 samples of each organ were analyzed certain organs appear to concentrate specific elements. With regards to black spruce, outer, scaly bark concentrates Cr, Zn and Pb; twigs concentrate Fe, Ni, Co, Cu and Au; needles concentrate Mn and are characterized by the highest ash content. When the standard deviations of the arithmetic means are examined it becomes apparent that a considerable overlap for some elements is present, so that a clear-cut case for one organ or another concentrating specific elements becomes invalid. This is particularly evident for Ni and Co since only 1 to 2 ppm Co and 4 to 5 ppm Ni separate the mean abundances for these elements in black spruce bark, twigs and needles. Comparison of trace element abundances of these organs to analytical data for twigs of the dwarf birch shows dramatic differences in concentration levels. Dwarf birch twigs are clearly superior to all organs of the black spruce in their ability to concentrate Fe, Zn, Au and As. This indicates that dwarf birch represents a valuable sampling medium for vegetation geochemical surveys for Au, particularly since As is often associated with Au mineralization. Histograms illustrating distribution of trace element populations and preferences of certain elements for specific vegetation organs are presented in Appendix 3.

**Variations in Metal Content along the Sampling traverse - Black Spruce and Dwarf Birch**

(i) Raw Data

Metal variations in the black spruce organs and the twigs of the dwarf birch vary sympathetically, in part, along the sampling traverse. These variations are discussed, compared and contrasted with geophysical (VLF-EM) responses. Variations in element concentration for organs of black spruce are discussed initially and then compared to chemical data from dwarf birch twigs. Element profiles are discussed on the basis of raw and normalized data.

TABLE 3

COMPARISON OF METAL CONCENTRATIONS BETWEEN BLACK SPRUCE (B.S.) ORGANS AND DWARF BIRCH (D.B.) TWIGS. ALL MEANS CALCULATED ON THE BASIS OF n=13 EXCEPT FOR THOSE DETERMINATIONS ACCOMPANIED BY A BRACKETED FIGURE INDICATING THE NUMBER OF SAMPLES AVERAGED. ALL ANALYSES IN PPM EXCEPT AU (PPB) AND ASH (%)

Element and Arithmetic Mean

| Plant Organ | Cr | Mn | Co | Fe | Ni | Cu | Zn | Pb | Au (ash) | Au (un-ashed) | As | Ash | Ba |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B.S. Needles | 4 | 14946 | 2(10) | 531 | 4(5) | 32 | 1679 | 12 | 0.4 | 0.3(8) | n.d. | 3.46 | -- |
| B.S. Twigs | 12 | 6492 | 4 | 4438 | 9 | 92 | 2096 | 48 | 0.9 | 0.7(9) | n.d. | 2.13 | -- |
| B.S. Bark | 16 | 8081 | 3 | 912 | 5 | 47 | 2870 | 65 | 0.5 | 0.4 | 0.5 | 3.19 | -- |
| D.B. Twigs | 18 | 8392 | 5 | 13390 | 7 | 78 | 9353 | 54 | 49 | 1.2 | Ash-6 Unash-0.1 | 2.30 | 2011 |

Data depicted in Figures 2 to 8 indicate sympathetic variations in the concentration of certain trace elements in various organs of black spruce and dwarf birch. Element responses in samples collected from the transect may be erratic to nondescript in one or in all plant organs. For instance, Co in black spruce has a limited range of less than 1 ppm up to 6 ppm with mean (arithmetic) abundances of 2, 3 and 4 ppm in needles, twigs and bark, respectively. Although dwarf birch has a somewhat higher range of Co concentrations (2 to 15 ppm) no discernible patterns are present for this element in either black spruce or dwarf birch (Fig. 4). Variations in concentration of the remainder of the elements determined for this study in plant organs collected along the transect are described in turn.

The following short forms are used in the discussion below: black spruce needles - BSN, black spruce twigs - BST, black spruce bark - BSB, and dwarf birch twigs - DBT.

Copper (Fig. 2)

Nondescript patterns are observed for BSB and BSN whereas a 2-sample anomaly of 141 and 134 ppm is observed for BST at locations 85-1 and 85-2 and a single sample anomaly (105 ppm) at station 85-8. A gradual increase in Cu content is observed proceeding from 85-1 (84 ppm) to 85-11 (101 ppm) in DBT.

Lead (Fig. 2)

A 2-sample anomaly of 217 and 167 ppm is observed for BST at locations 85-1 and 85-2. Overall a trend of decreasing Pb content from 85-1, (217 ppm) to 85-6 (25 ppm) is apparent. Samples 85-10 to 85-13 representing DBT contain elevated Pb contents (68 to 75 ppm) as compared to the remainder of the samples (29 to 68 ppm) and constitute a poorly developed increase in Pb contents between samples 85-1 and 85-13. Trends for BST and BSN are nondescript.

Zinc (Fig. 3)

A well developed trend of increasing Zn is present for BSB and DBT between samples 85-1 (BSB - 2100 ppm) and 85-13 (BSB - 2560) with the highest

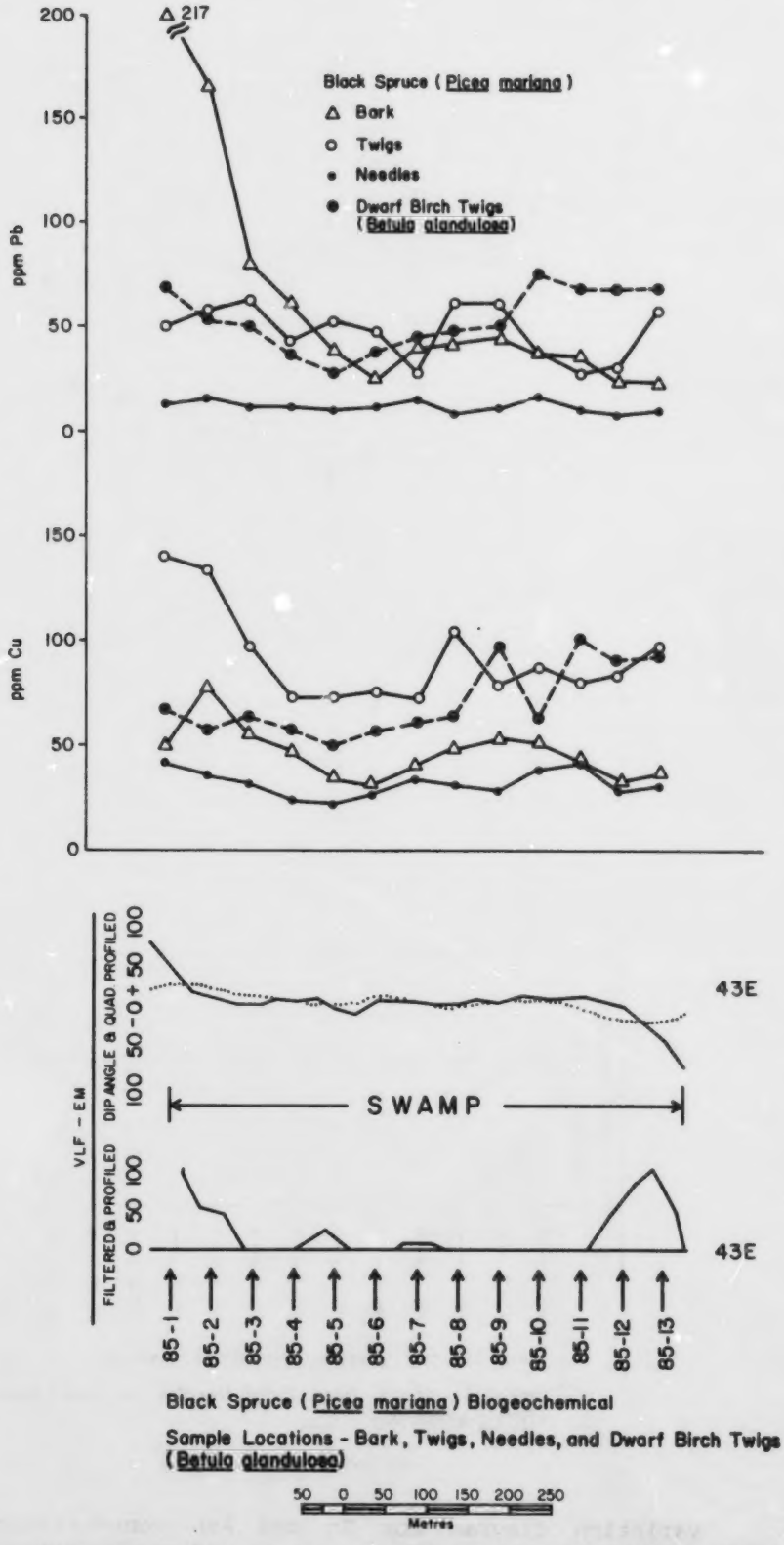


**Figure 2:** **Variation diagram for Cu and Pb concentrations in black spruce and dwarf birch organs and a comparison with VLF-EM results.**

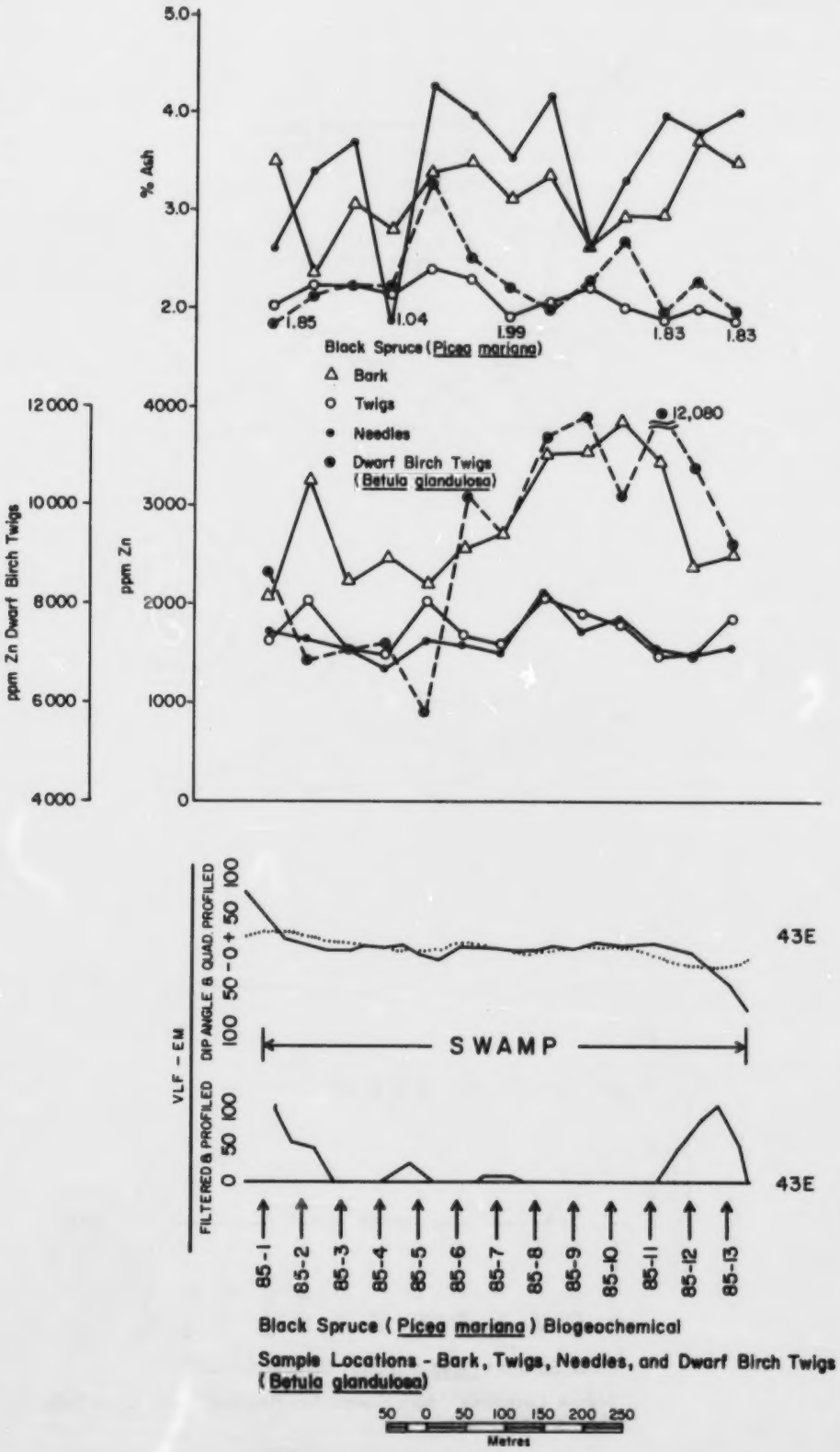


**Figure 3:** **Variation diagram for Zn and Ash concentrations in black spruce and dwarf birch organs and a comparison with VLF-EM results.**

Zn content occurring in sample 85-10 for BSB (3920 ppm) and in sample 85-11 for DBT (1208 ppm). The Zn trend is smoother and less erratic for BSB, despite a single sample anomaly of 3280 ppm at 85-2, although both sampling media indicate a multi-sample anomaly between sample stations 85-5 and 85-13. Trends for BSN and BST are nondescript.

Ash (Fig. 3)

The variation in ash content for each of the four sampling media are erratic. Ash content of BST and DBT is less erratic than for BSN and BSB with a restricted ash range of 1.83 to 2.41% and 1.85 to 2.74%, respectively. The range in ash content for BSN (1.04 to 4.22%) and BSB (2.37 to 3.80%) reflects the highly variable ash content in these sample media. No trends were observed in the variation of ash content along the sampling transect.

Manganese (Fig. 4)

A well defined trend for Mn in each of BSN, BST, BSB and DBT is observed over the entire sampling transect. Sympathetic variation of Mn in each plant organ is reflected by similar trends in the Mn contents for every sample of BST, BSB and DBT; BSN contains a significantly higher mean concentration of Mn (14946 ppm) than either BST (6492 ppm), BSB (8081) or DBT (8392). A Mn anomaly is centered on samples 85-8 to 85-11.

Nickel (Fig. 5)

Trends for Ni along the sampling transect are reflected by a poorly developed decrease in Ni concentrations in BST and BSB from samples 85-1 and 85-2 to 85-13. In BST, samples 85-1, 2 and 3 contain 14, 17 and 13 ppm Ni with samples thereafter decreasing to a range in concentration of 4 to 10 ppm. Samples 85-1 and 85-2 also contain higher Ni (11 ppm) in BSB than subsequent samples (3 to 6 ppm). Patterns for Ni in DBT and BSN are nondescript with only 5 of 13 BSN samples containing measurable Ni.

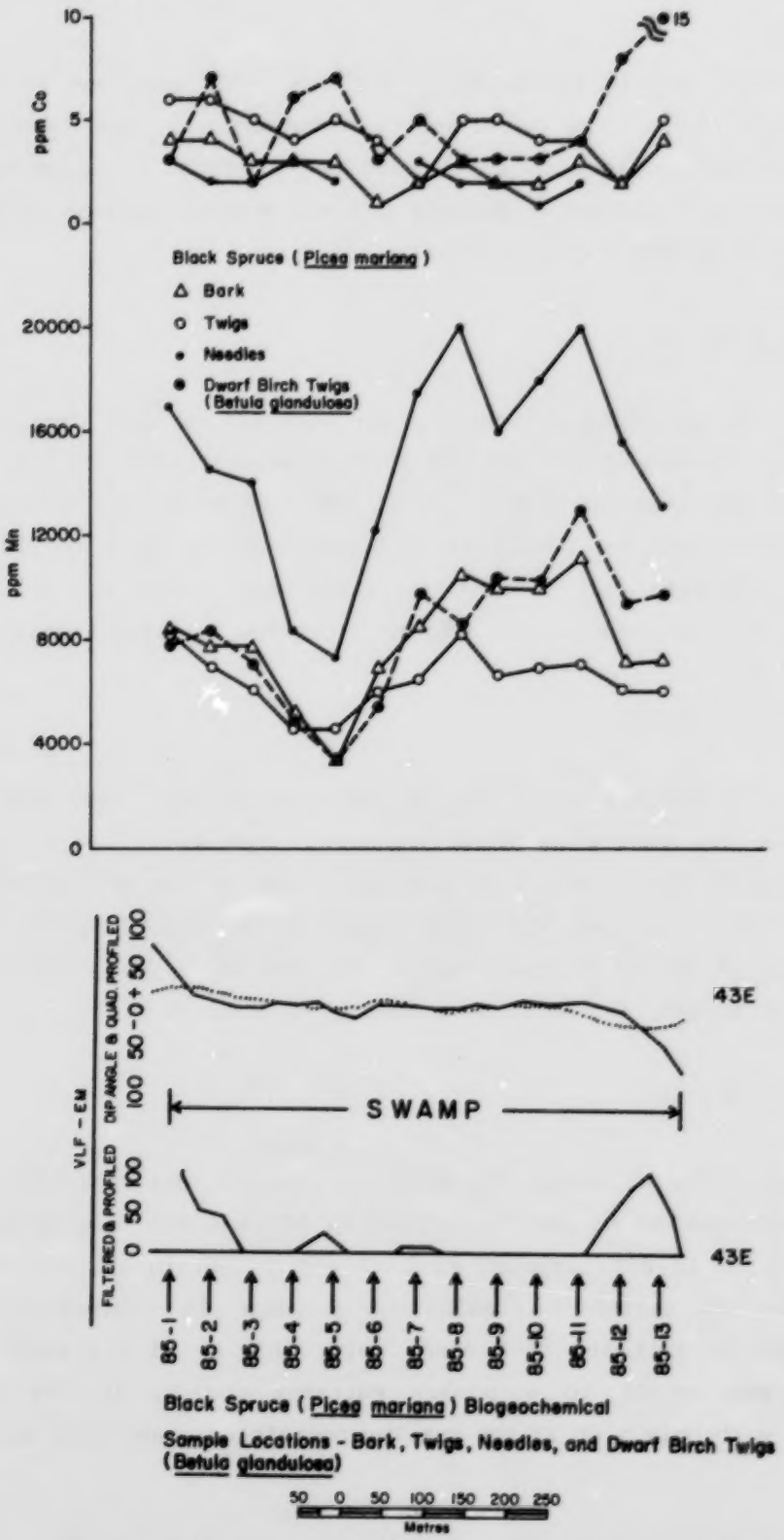


**Figure 4:** Variation diagram for Mn and Co concentrations in black spruce and dwaft birch organs and a comparison with VLF-EM results.

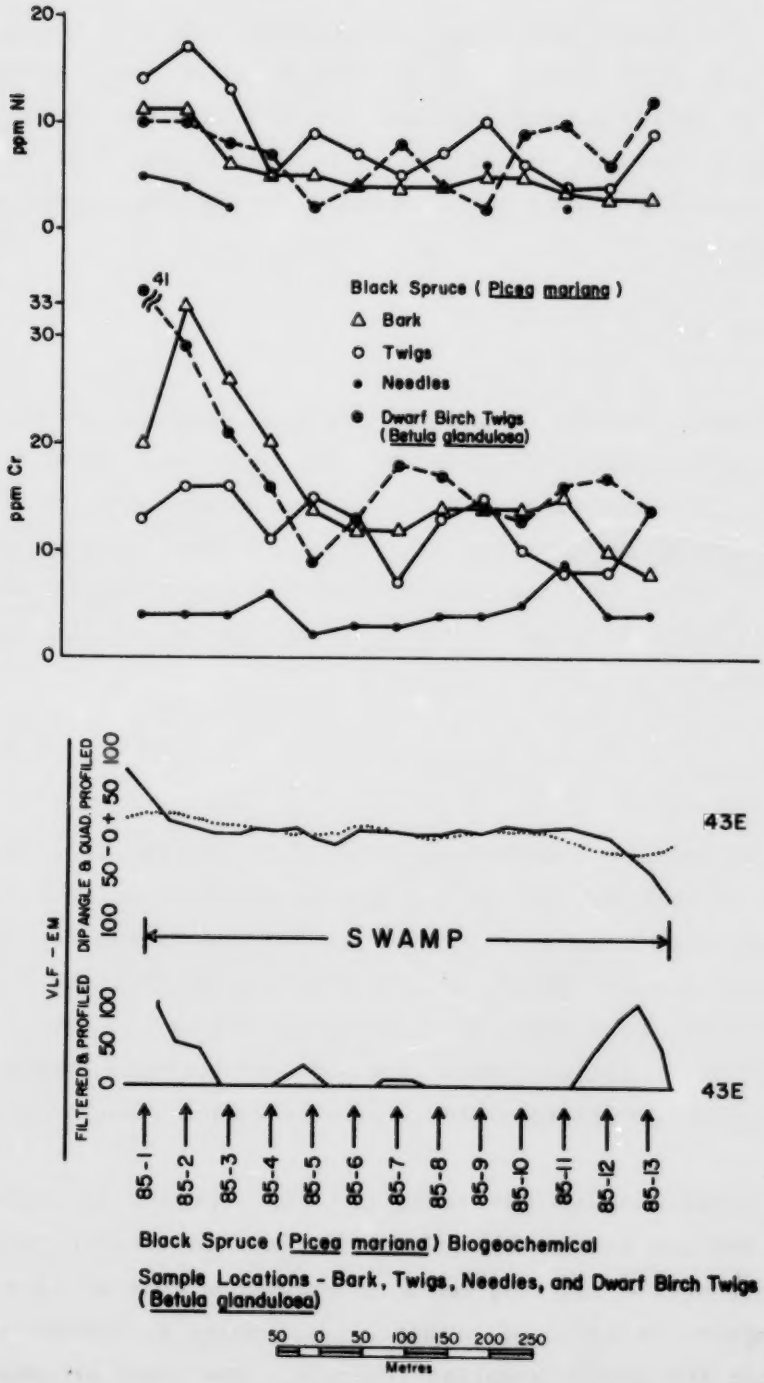


**Figure 5:** **Variation diagram for Ni and Cr concentrations in black spruce and dwarf birch organs and a comparison with VLF-EM results.**

Chromium (Fig. 5)

The Cr contents for sample media range from 2 to 9 ppm for BSN, 7 to 16 ppm for BST, 8 to 33 ppm for BSB and 9 to 44 ppm. Along the transect nondescript Cr patterns were obtained for BSN and BST whereas DBT and BSB indicate high Cr contents in samples 85-1 to 85-4 (DBT = 16 to 41 ppm; BSB = 20 to 33 ppm). Thereafter, the Cr content in BSB decreases gradually to the end of the transect.

Iron (Fig. 6)

Extremely erratic trends for Fe are observed in BST and DBT with ranges in concentration of 2200 to 6000 ppm and 2759 to 120000 ppm, respectively. Iron content of BSN is contrasted with BST and DBT with a lower and narrower concentration range of 360 to 730 ppm. In BSB, samples 85-1, 2 and 3 contain 1440, 1380 and 1520, respectively; subsequent samples decrease in Fe content with a range of 530 to 1130 ppm to the end of the sampling traverse.

Gold (Fig. 7)

Au in unashed samples ranges in concentration from below the limits of detection in BSN and BST to 5.6 ppb in DBT (sample 85-8). For the most part data are highly variable without discernible trends for BSN and BST. A trend for decreasing Au content in BSB from samples 85-1 and 85-2 (0.9 and 1.1 ppb, respectively) to samples 85-3 to 85-13 (0.2 to 0.5 ppb) may be present. A suggestion of a similar trend for DBT is present; however, the highly erratic nature of the pattern makes this observation questionable.

In ashed samples the range of gold contents is higher as expected (0.2 ppb in BSN and BSB to 110 ppb in DBT) but the erratic patterns observed for Au in most of the sampling media in unashed samples are also present for Au in ashed samples. A trend of gradually decreasing Au content in ashed BSB is observed along the entire sampling transect. The trend proceeds from 0.9 ppb in samples 85-2 and 85-3 to 0.2 ppb in sample 85-13. Single sample Au "anomalies" are present for BSN, BST and DBT along the transect.

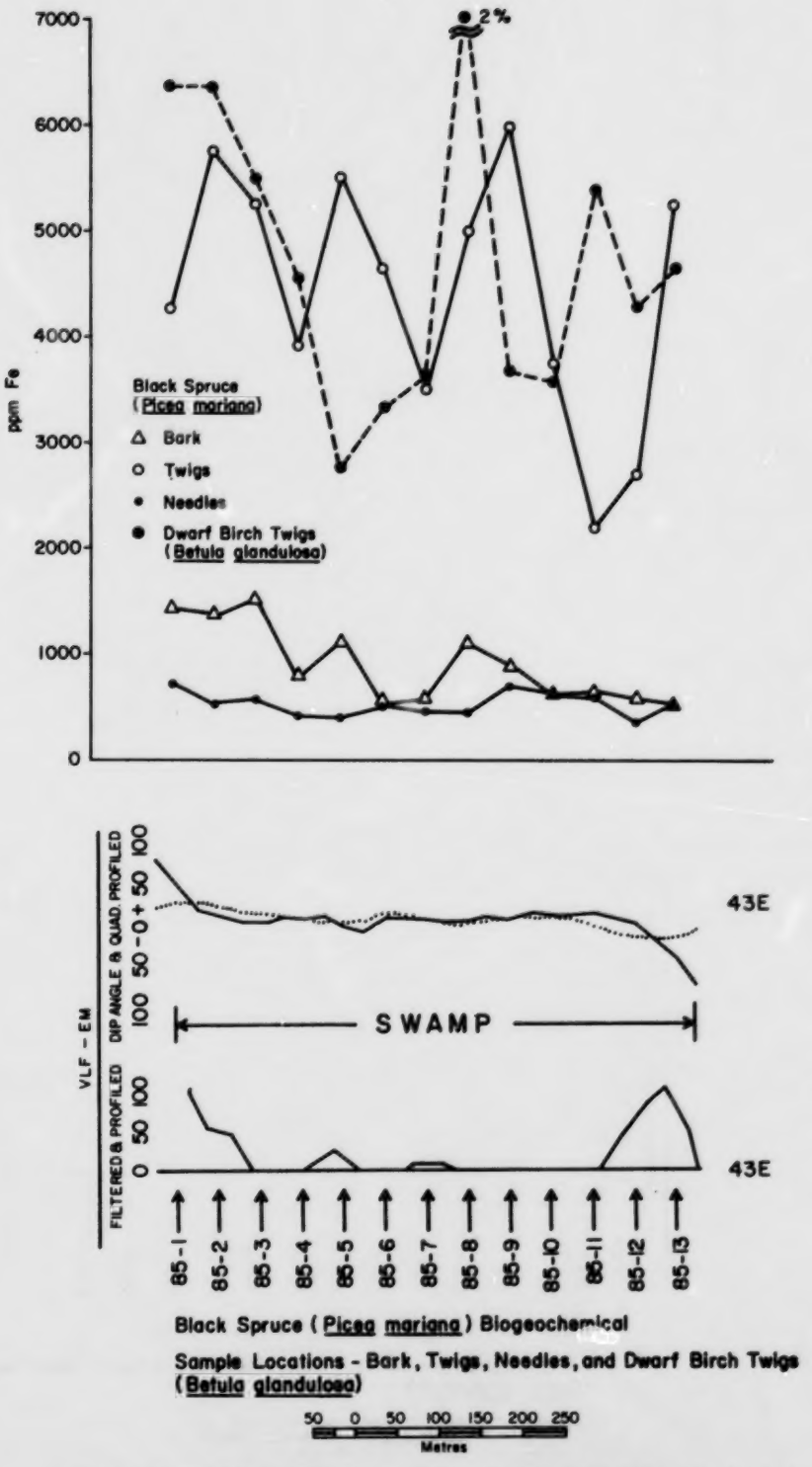


**Figure 6:** **Variation diagram for Fe concentrations in black spruce and dwarf organs and a comparison with VLF-EM results.**

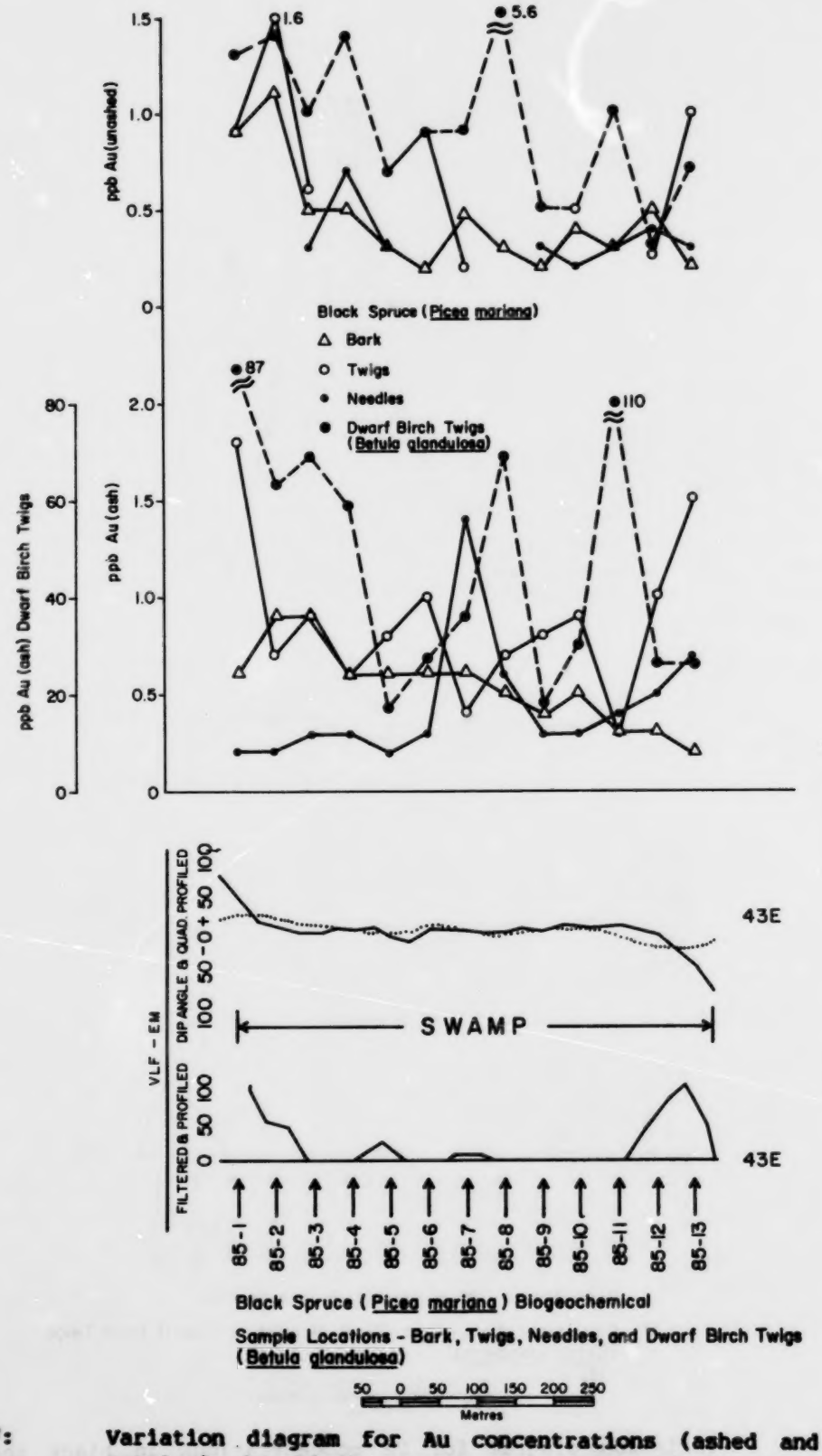


**Figure 7:** **Variation diagram for Au concentrations (ashed and unashed samples) in black spruce and dwarf birch organs and a comparison with VLF-EM results.**

Arsenic (Fig. 8)

A trend for As in unashed DBT samples was not observed; 9 of 13 samples were below the limits of detection and the remaining 4 samples have a narrow range of 0.1 to 0.2 ppm. Arsenic in ashed DBT samples indicates a discernible trend over the entire transect. A 4-sample anomaly is defined by samples 85-8, 10, 11 and 12 with a range in concentration of 5.1 to 6.3 ppm As. Samples 85-1 and 85-2 contain "anomalous" As contents of 6.9 and 4.6 ppm, respectively; samples that precede the 4-sample anomaly (85-3, 4, 5, 6) define a zone of low As.

Barium (Fig. 8)

A somewhat erratic, but nevertheless discernible anomaly pattern for Ba contents in DBT is present over the entire sampling transect. A 3-sample anomaly is delineated by 85-10, 11 and 12 with a concentration range of 2259-2547 ppm. This anomaly is preceded by a decrease in Ba content from an initial high analysis of 2373 ppm in sample 85-1 to a low of 1583 ppm in 85-8.

(ii) Normalized Data

Geochemical data from the analysis of ashed samples of black spruce and dwarf birch organs were normalized to ash content, Mn and Ba. The data were replotted and a comparison drawn between raw and normalized results. Ash, Mn and Ba were selected as normalizing factors because of concern that (1) drainage effects (i.e. Mn content) might obscure or distort bona fide trace element anomalies, (2) ash content may be affected by airborne particulate contamination thereby distorting mineralization-related trace element anomalies and (3) previous studies (Fedikow, 1987) indicate that data normalized with respect to the essential element Ba were capable of reflecting the presence of mineralization in vegetation geochemistry on a much broader scale than any single element. Results of the normalized data examination are summarized in Tables 4 and 5; plots and normalized data are given in Appendix IV.

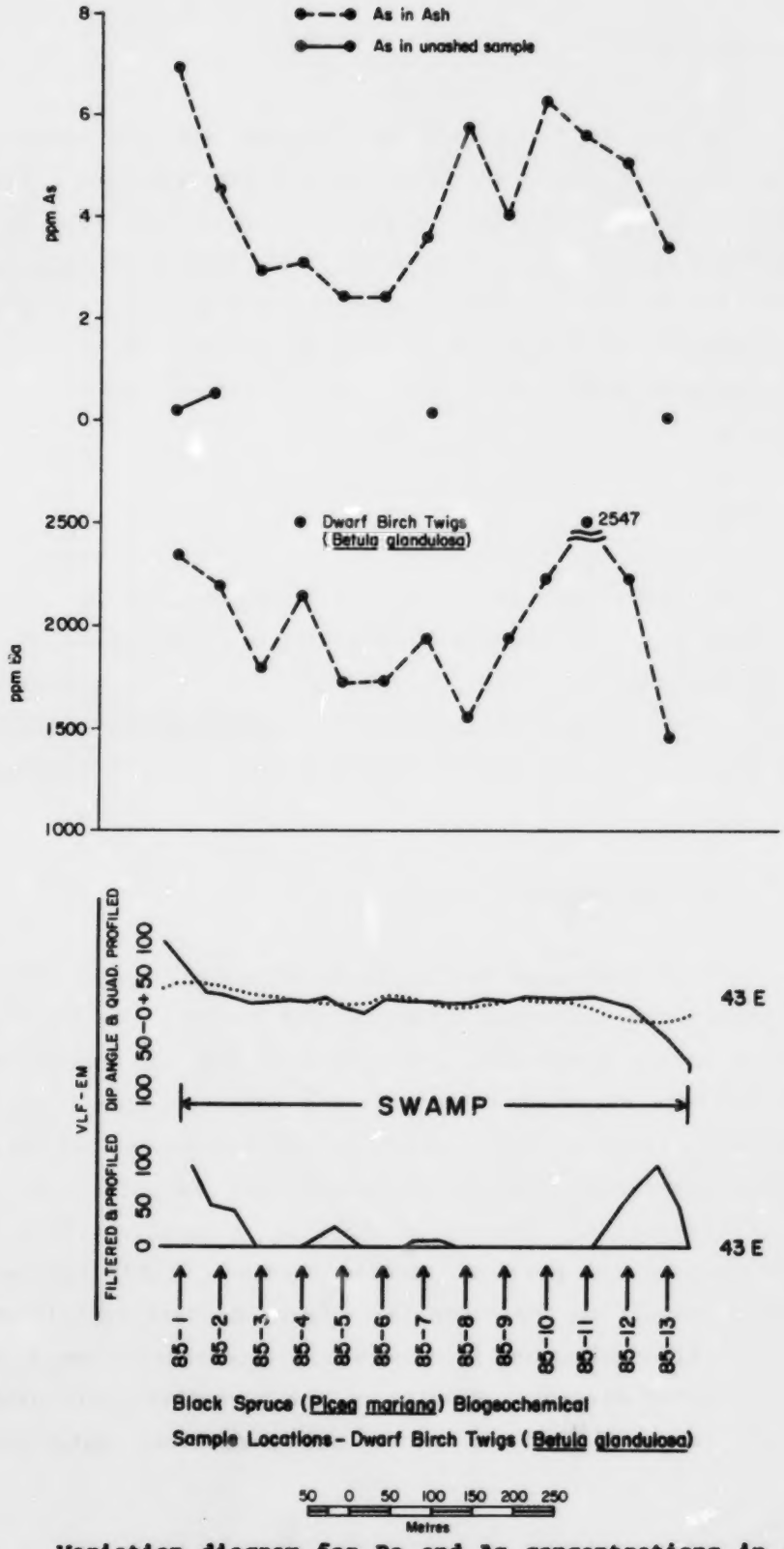


**Figure 8:** **Variation diagram for Ba and As concentrations in dwarf birch twigs and a comparison with VLF-EM results.**

**TABLE 4**
**SUMMARY OF A COMPARISON OF RATIOED VERSUS SINGLE ELEMENT PATTERNS ALONG THE SAMPLING TRANSECT FOR BLACK SPRUCE ORGANS.**

**X = ELEMENT OF INTEREST**

| | ELEMENT AND RATIO | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cu | Pb | Zn | Ni | Co | Cr | Fe | Mn | Au | As |
| Black Spruce Needles | | | | | | | | | | |
| X/Mn | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | - | - |
| X/Ash | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | - | - |
| (X/Ash)/Mn | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | - | - |
| Black Spruce Twigs | | | | | | | | | | |
| X/Mn | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | - | |
| X/Ash | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | - | - |
| (X/Ash)/Mn | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | - | - |
| Black Spruce Bark | | | | | | | | | | |
| X/Mn | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | - | - |
| X/Ash | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | - | - |
| (X/Ash)/Mn | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | - | - |

Notes:

The number 1 indicates an improvement in the definition of a pattern for a particular element after normalizing; 2 indicates no improvement. Ratios for Au and As in black spruce organs were not attempted due to the low concentration levels of these elements.

TABLE 5
SUMMARY OF A COMPARISON OF RATIOED VERSUS SINGLE ELEMENT PATTERNS ALONG THE SAMPLING TRANSECT FOR DWARF BIRCH TWIGS.
(CONVENTIONS AS FOR TABLE 4).

| | ELEMENT AND RATIO | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Cu | Pb | Zn | Ni | Co | Cr | Fe | Mn |
| ORGAN | | | | | | | | |
| Dwarf Birch Twigs | | | | | | | | |
| X/Mn | 1 | 2 | 1 | 2 | 1 | 1 | 1 | - |
| X/Ash | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 |
| X/Ba | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 2 |
| (X/Ash)/Mn) | 2 | 1 | 2 | 1 | 2 | 1 | 1 | - |
| (X/Ash)/Ba) | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 |

| | ELEMENT AND RATIO | | |
|---|---|---|---|
| | Au | As | Ba |
| ORGAN | | | |
| Dwarf Birch Twigs | | | |
| X/Mn | 2 | 2 | 1 |
| X/Ash | 2 | 2 | 2 |
| X/Ba | 2 | 2 | - |
| (X/Ash)/Mn) | 2 | 2 | 1 |
| (X/Ash)/Ba) | 2 | 2 | - |

## Anomaly Configuration

Inspection of Tables 4 and 5 indicates significant improvements in the definition of anomalous contents/responses of trace elements in black spruce and dwarf birch organs can be realized by utilizing ratioed data. Anomaly definition for (1) Cu, Pb, Zn, Co, Cr and in part for Fe in black spruce needles, (2) Cu, Pb, Ni, Co, Cr and Fe in black spruce bark, and (3) Fe in dwarf birch twigs was improved by each of the ratios utilized. Variable success in anomaly definition improvement for the remainder of the elements in black spruce and dwarf birch twigs is indicated in Tables 4 and 5. Of particular interest is the failure of ratioed data to improve the anomaly configuration for Au and As in ashed samples of dwarf birch twigs. In this survey Au and As data may best be interpreted as unratioed data. Apparently the geochemical response for these elements in the vegetation samples collected is not significantly altered by drainage and/or airborne particulate contamination.

## Anomaly Location

Many of the peaks and troughs representing high and low trace element contents in vegetation sampled for this study defined by single element, raw data are reproduced by using ratioed data. In some instances the use of ratioed data produces a more erratic or distorted anomaly configuration. The ratios Zn/Mn, Cr/Mn, Fe/Mn, (Cr/Ash)/Mn and (Fe/Ash)/Mn in black spruce bark and dwarf birch twigs, however, produce somewhat different anomaly patterns. The Fe/Mn and Cr/Mn plots indicate a 5 sample anomaly between sample stations 85-1 (50 m) and 85-5 (250 m). The Cr/Mn ratio is essentially a repetition of the profile for Cr in black spruce bark except that a greater number of anomalous samples define the Cr anomaly. In dwarf birch twigs the Cr/Mn pattern is similar to the Cr pattern with the exception that subsidiary peaks are not present in the Cr/Mn. Rather, the result for Cr/Mn indicates a steadily decreasing concentration of Cr from 50 m on the sampling transect

onwards. The Fe/Mn pattern in black spruce bark is similar to the Cr/Mn results with a 5 sample anomaly indicated between 50 and 250 m. This contrasts with the unratioed data which indicate a 3 sample anomaly between 50 and 150 m and single sample subsidiary peaks at 250 and 400 m. For dwarf birch twigs a single sample anomaly is indicated for ratioed data at 400 m along the sampling transect. This may be contrasted with the erratic unratioed Fe pattern in Figure 6. The Fe/Mn single sample anomaly is related to the magnitude of the response in that sample, i.e., the sample at station 85-8 contains 2% (20 000 ppm) Fe whereas the next highest response is approximately 6300 ppm at station 85-1 and 85-2. The Zn/Mn profile for black spruce bark is somewhat erratic indicating a poorly defined 2 sample anomaly between 200 and 250 m with a second 2 sample anomaly between 600 and 650 m. This contrasted with a 6 sample Zn anomaly between 350-600 m with a single sample subsidiary peak at 100 m for unratioed data. In this instance the application of ratioed data has downgraded an anomaly (with regard to the number of geochemically anomalous samples within the anomaly) and consequently the definition of the anomaly.

Doubly normalizing data (i.e. first normalizing the data with respect to ash and then normalizing a second time to Mn) generally does not improve the trace element response. The (Cr/Ash)/Mn and the (Fe/Ash)/Mn ratios for black spruce bark and dwarf birch twigs give essentially the same information. The patterns may be less erratic but little is gained in anomaly definition improvement. Certainly no additional anomalous samples are indicated using this method.

Normalized geochemical data from this vegetation geochemical survey have resulted in mixed success in enhancing the observed anomalous responses in trace element content along the sampling transect. Some data have been significantly improved in terms of anomaly definition whereas other patterns are either unchanged or downgraded. Of particular interest is the failure of ratios to improve upon the Au and As anomalies in vegetation samples along the transect. In view of the considerable information that can be obtained from vegetation geochemical surveys regarding the nature of overburden and bedrock, the exercise of normalizing vegetation geochemical data should be routinely attempted. The normalizing factors, such as ash content or Mn, should be

included in any exercise of this sort. False geochemical anomalies, induced by drainage or airborne particulate effects, may be filtered from a geochemical data set and excluded from further exploration consideration.

Regardless of geochemical data treatment the use of ratioed or unratioed data in this study must be regarded as empirical observation since no information regarding the underlying geology is available. Until such time as geological information regarding nature of overburden, type of bedrock, presence or absence of mineralization and nature of mineralization becomes available, the results of this vegetation geochemical survey must not be used to infer mineralized zones.

## Comparison of vegetation geochemical and VLF-EM responses

The VLF-EM survey results along the vegetation geochemical sampling transect are shown (and compared with vegetation geochemical profiles) in Figures 2 through 8. Survey results reflect edge effects at stations 85-1,2 and 85-11,12 and 13, that is, the response of outcrop beneath swamp and at the edge of the swamp. Two responses at stations 85-5 and 85-7 may represent undulating swamp-bedrock interface. No responses to mineralization are observed along the profile. Accordingly, the comparison between the geophysical and vegetation geochemical results is limited to topographic relationships. An example of this is the contents of Cu in black spruce twigs and Pb in black spruce bark (2 sample anomalies, stations 85-1, 85-2, in Fig. 2), Ni in black spruce twigs (1 sample anomaly, station 85-2, Fig. 5) and Cr in black spruce bark and black spruce needles (2 sample anomalies, stations 85-1,2, Fig. 5). These high contents in the various vegetation organs probably represent detrital shedding due to drainage and/or wind-blown contaminants into the swamp and subsequent uptake by vegetation root systems.

## DISCUSSION

Similarities between black spruce organs and dwarf birch twigs in many elements are apparent over portions of, or in some cases, the entire sampling transect. Initial high concentrations are observed for the elements Cu (BST), Pb and Fe (BSB), Ni (BST and BSB), Cr (BSB and DBT), Au (DBT, BST, BSB), As and Ba (DBT) in samples 85-1, 2 and 3. These patterns correspond to a VLF-EM response related to edge effects or undulating topography and might be related to detrital shedding into the sample sites by wind or meteoric waters. A 3 to 4 sample anomaly reflected in samples 85-8 to 85-12 is persistent for Zn (BSB and DBT), Mn (all organs), As and Ba (DBT) along this portion of the transect. The highest Au analysis (110 ppb in DBT) was obtained from this locality. In previous studies where Ba contents have been determined in vegetation associated with mineralized zones, a Ba depletion has been noted. The Ba enrichment in DBT associated with the high Au, Zn, Mn and As is contrary to previous observations. The high Mn associated with this multi-element anomaly further complicates interpretation since the generation of false Au and Zn vegetation geochemical anomalies has been documented in vegetation containing high Mn (Fedikow, 1987). The explanation for the high Mn and generation of false geochemical anomalies may be related to changes in the physiochemical environment brought about by drainage. In this study, samples were collected during the winter from a frozen bog. Element contents in vegetation residing within the bog will therefore have been affected by water table, ponded waters, organic-rich muds and numerous other components of the overburden during the spring, summer and fall. To date, no diamond drilling or trenching has been conducted in the immediate area; favourable geology and proximity to a former producing gold mine are factors indicating that further work should be undertaken.

The high gold contents of the dwarf birch twigs (17 to 110 ppb Au in ash) indicate the dwarf birch has considerable potential for collecting and storing gold and as such represents a valuable vegetation type for use in gold exploration vegetation geochemical surveys where suitable overburden conditions can be ascertained. The erratic results for Au (and generally the

rest of the elements) in the dwarf birch twigs along the transect indicate the twigs may be more useful in delineating high gold regions rather than more localized target anomalies. The erratic nature of these trace element data, however, may reflect the presence of mineralization in the same way as skewed data distributions with high variance reflect mineralization-related alteration phenomena in rocks. The geochemical analyses of dwarf birch twigs represent base-line data for this species in Manitoba; further studies will be required before its usefulness can be ascertained. A valid observation and concern would be that the dwarf birch is also susceptible to drainage effects, changing pH due to the degree of water saturation in overburden, and subsequently the generation of false drainage-related anomalies. This is substantiated by the similarity in the Mn trend for both black spruce and dwarf birch.

## CONCLUSIONS

The following conclusions are apparent from this vegetation geochemical survey:

1. Dwarf birch twigs contain more gold (in ashed samples) than any sampled organ of the black spruce. As significant collectors of gold the dwarf birch twigs represent a valuable sampling medium for vegetation geochemical surveys for gold.
2. Dwarf birch twigs and black spruce needles, twigs and bark mimic one another with respect to Mn contents along the sampling transect. Sympathetic variation between vegetation organs and a variety of trace elements occur along portions of the sampling transect. This may reflect drainage, the presence of mineralization beneath the bog, and/or a common ability of the organs to extract certain trace elements from this environment.
3. Erratic trace element responses within this small study area may suggest the technique is more suitable for identifying local or general areas of interest rather than specific targets. Alternatively, absolute decisions regarding the success or failure of a vegetation geochemical survey should not be based on a single sampling transect but rather on a grid over the area of interest.

4. Data normalizing should be attempted in terrain where drainage or airborne particulate effects could possibly mask or enhance trace element geochemical responses to buried mineralization.

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## APPENDIX I: ANALYTICAL SPECIFICATIONS

Black spruce (Picea mariana needles, twigs and bark
and dwarf birch (Betula glandulosa) twigs

| Element | Original Weight | Ash | Extraction | Method | Lower Limit of Detection | Size Fraction |
|---|---|---|---|---|---|---|
| Cr | 30g | Yes | HCL-HN03 (1:3) | AAS | 2 ppm | -20 |
| Mn | 30g | Yes | HCL-HN03 (1:3) | AAS | 1 ppm | -20 |
| Fe | 30g | Yes | HCL-HN03 (1:3) | AAS | 1 ppm | -20 |
| Co | 30g | Yes | HCL-HN03 (1:3) | AAS | 1 ppm | -20 |
| Ni | 30g | Yes | HCL-HN03 (1:3) | AAS | 2 ppm | -20 |
| Cu | 30g | Yes | HCL-HN03 (1:3) | AAS | 1 ppm | -20 |
| Zn | 30g | Yes | HCL-HN03 (1:3) | AAS | 1 ppm | -20 |
| Pb | 30g | Yes | HCL-HN03 (1:3) | AAS | 2 ppm | -20 |
| Ba | 10g | Yes | HCL-HN03 (1:3) | AAS | 1 ppm | -20 |
| Au | 30g | Yes | - | INAA | 0.1 ppb | -20 |
| Au | 30g | No | - | INAA | 0.1 ppb | -20 |
| As | 30g | No | - | INAA | 0.1 ppm | -20 |
| Ash | 30g | | MUFFLE FURNACE | GRAVIMETRIC | 0.001 ppm | -20 |

## APPENDIX II RAW DATA

Part 1: Black spruce (Picea mariana) needles

Part 2: Black spruce (Picea mariana) twigs

Part 3: Black spruce (Picea mariana) bark

Note: "n.d." - not detected, below the limits of detection for the analytical technique

Part 1: Black spruce (Picea mariana) needles

| Sample Number | Cr (ppm) | Mn (ppm) | Fe (ppm) | Co (ppm) | Ni (ppm) | Cu (ppm) | Zn (ppm) | Pb (ppm) | Au (ash; ppb) | Au (dry sa;ppb) | As (dry sa; ppm) | Ash (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N85-1 | 4 | 17000 | 730 | 3 | 5 | 42 | 1742 | 13 | 0.2 | 0.2 | 0.10 | 2.63 |
| N85-2 | 4 | 14800 | 540 | 2 | 4 | 36 | 1665 | 16 | 0.2 | n.d. | n.d. | 3.41 |
| N85-3 | 4 | 14000 | 590 | 2 | 2 | 32 | 1546 | 12 | 0.3 | 0.3 | 0.10 | 3.73 |
| N85-4 | 6 | 8200 | 410 | 3 | n.d. | 24 | 1397 | 12 | 0.3 | 0.7 | 0.10 | 1.04 |
| N85-5 | 2 | 7400 | 400 | 2 | n.d. | 22 | 1650 | 10 | 0.2 | 0.3 | n.d. | 4.34 |
| N85-6 | 3 | 12300 | 500 | n.d. | n.d. | 26 | 1628 | 12 | 0.3 | n.d. | 0.10 | 4.01 |
| N85-7 | 3 | 17600 | 460 | 3 | n.d. | 34 | 1553 | 15 | 1.4 | n.d. | n.d. | 3.58 |
| N85-8 | 4 | 20000 | 460 | 2 | n.d. | 32 | 2190 | 9 | 0.6 | n.d. | n.d. | 4.22 |
| N85-9 | 4 | 16000 | 700 | 2 | 6 | 29 | 1784 | 12 | 0.3 | 0.3 | 0.10 | 2.69 |
| N85-10 | 5 | 18000 | 630 | 1 | n.d. | 39 | 1905 | 16 | 0.3 | 0.2 | n.d. | 3.37 |
| N85-11 | 9 | 20000 | 600 | 2 | 2 | 42 | 1610 | 11 | 0.4 | 0.3 | n.d. | 4.03 |
| N85-12 | 4 | 15300 | 360 | n.d. | n.d. | 29 | 1556 | 9 | 0.5 | 0.4 | n.d. | 3.88 |
| N85-13 | 4 | 13200 | 520 | n.d. | n.d. | 32 | 1605 | 10 | 0.7 | 0.3 | n.d. | 4.09 |

Part 2: Black spruce (Picea mariana) twigs

| Sample Number | Cr (ppm) | Mn (ppm) | Fe (ppm) | Co (ppm) | Ni (ppm) | Cu (ppm) | Zn (ppm) | Pb (ppm) | Au (ash; ppb) | Au (dry sa;ppb) | As (dry sa; ppm) | Ash (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T85-1 | 13 | 8200 | 4250 | 6 | 14 | 141 | 1645 | 50 | 1.8 | 0.9 | 0.10 | 2.03 |
| T85-2 | 16 | 7000 | 5750 | 6 | 17 | 134 | 2074 | 58 | 0.7 | 1.6 | 0.10 | 2.25 |
| T85-3 | 16 | 6100 | 5250 | 5 | 13 | 97 | 1556 | 63 | 0.9 | 0.6 | 0.10 | 2.25 |
| T85-4 | 11 | 4500 | 3900 | 4 | 5 | 73 | 1514 | 44 | 0.6 | n.d. | 0.10 | 2.19 |
| T85-5 | 15 | 4500 | 5500 | 5 | 9 | 73 | 2055 | 52 | 0.8 | 0.7 | 0.10 | 2.41 |
| T85-6 | 13 | 6000 | 4650 | 4 | 7 | 76 | 1723 | 48 | 1.0 | 0.9 | 0.10 | 2.34 |
| T85-7 | 7 | 6500 | 3500 | 2 | 5 | 73 | 1625 | 29 | 0.4 | 0.2 | 0.10 | 1.99 |
| T85-8 | 13 | 8200 | 5000 | 5 | 7 | 105 | 2134 | 61 | 0.7 | n.d. | 0.10 | 2.13 |
| T85-9 | 15 | 6800 | 6000 | 5 | 10 | 79 | 1965 | 61 | 0.8 | n.d. | 0.10 | 2.29 |
| T85-10 | 10 | 7000 | 3750 | 4 | 6 | 87 | 1879 | 38 | 0.9 | 0.5 | n.d. | 2.09 |
| T85-11 | 8 | 7100 | 2200 | 4 | 4 | 80 | 1515 | 28 | 0.3 | n.d. | n.d. | 1.83 |
| T85-12 | 8 | 6500 | 2700 | 2 | 4 | 83 | 1560 | 31 | 1.0 | 0.3 | n.d. | 2.07 |
| T85-13 | 14 | 6000 | 5250 | 5 | 9 | 99 | 1905 | 58 | 1.5 | 1.0 | 0.10 | 1.83 |

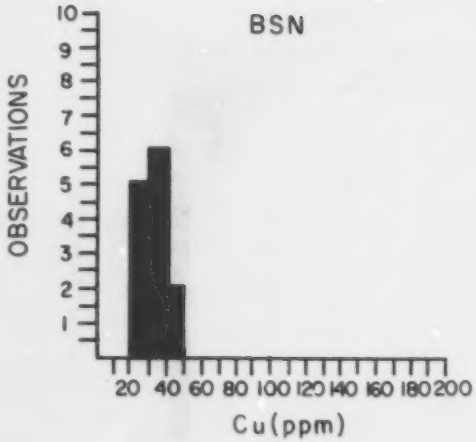
Part 3: Black spruce (Picea mariana) bark

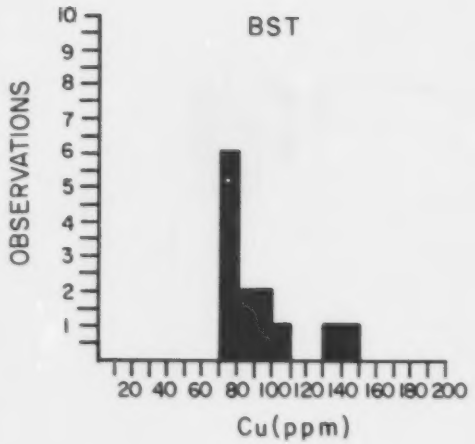
| Sample Number | Cr (ppm) | Mn (ppm) | Fe (ppm) | Co (ppm) | Ni (ppm) | Cu (ppm) | Zn (ppm) | Pb (ppm) | Au (ash; ppb) | Au (dry sa;ppb) | As (dry sa; ppm) | Ash (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B85-1 | 20 | 8250 | 1440 | 4 | 11 | 51 | 2100 | 217 | 0.6 | 0.9 | 0.20 | 3.54 |
| B85-2 | 33 | 7800 | 1380 | 4 | 11 | 78 | 3280 | 167 | 0.9 | 1.1 | 0.10 | 2.37 |
| B85-3 | 26 | 7800 | 1520 | 3 | 6 | 55 | 2250 | 80 | 0.9 | 0.5 | 0.10 | 3.08 |
| B85-4 | 20 | 5200 | 800 | 3 | 5 | 47 | 2480 | 61 | 0.6 | 0.5 | 0.10 | 2.85 |
| B85-5 | 14 | 3500 | 1130 | 3 | 5 | 37 | 2240 | 38 | 0.6 | 0.3 | 0.10 | 3.44 |
| B85-6 | 12 | 7000 | 550 | 1 | 4 | 33 | 2600 | 25 | 0.6 | 0.2 | 0.10 | 3.54 |
| B85-7 | 12 | 8700 | 600 | 2 | 4 | 40 | 2760 | 41 | 0.6 | 0.5 | 0.10 | 3.19 |
| B85-8 | 14 | 10750 | 1120 | 3 | 4 | 49 | 3560 | 42 | 0.5 | 0.3 | 0.10 | 3.41 |
| B85-9 | 12 | 10000 | 880 | 2 | 5 | 53 | 3600 | 44 | 0.4 | 0.2 | 0.10 | 2.70 |
| B85-10 | 12 | 10000 | 630 | 2 | 5 | 51 | 3920 | 39 | 0.5 | 0.4 | n.d. | 3.00 |
| B85-11 | 13 | 11250 | 670 | 3 | 4 | 44 | 3520 | 38 | 0.3 | 0.3 | 0.10 | 3.03 |
| B85-12 | 10 | 7400 | 590 | 2 | 3 | 34 | 2440 | 24 | 0.3 | 0.5 | 0.10 | 3.80 |
| B85-13 | 8 | 7400 | 530 | 4 | 3 | 40 | 2560 | 23 | 0.2 | 0.2 | 0.10 | 3.58 |

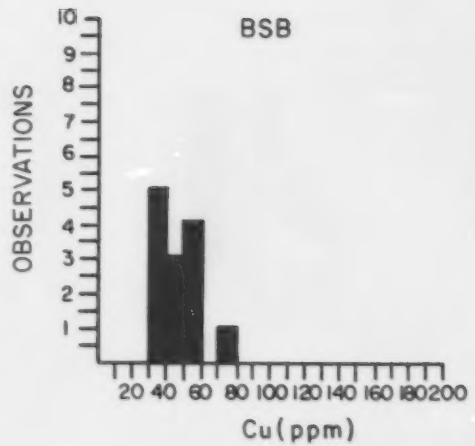
## APPENDIX III

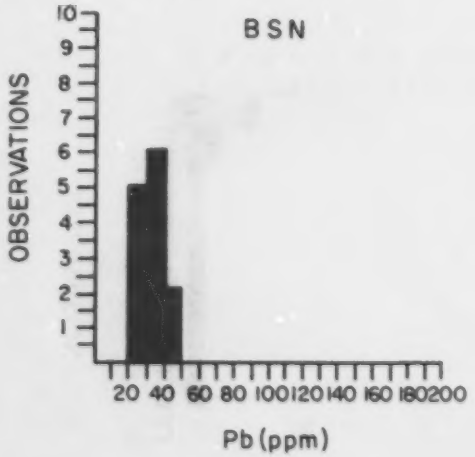
HISTOGRAMS - Black Spruce and Dwarf
- Birch Geochemical Data

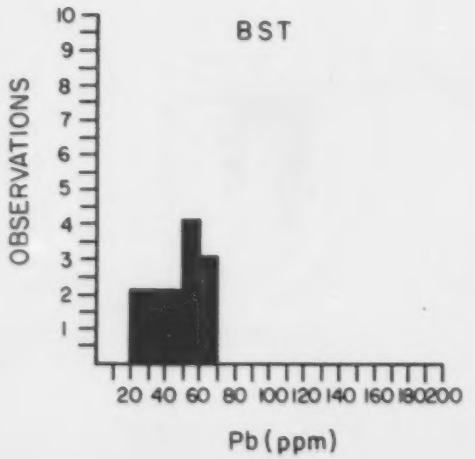
Abbreviations: BSN - Black Spruce Needles
BST - Black Spruce Twigs
BSB - Black Spruce Bark
DBT - Dwarf Birch Twigs

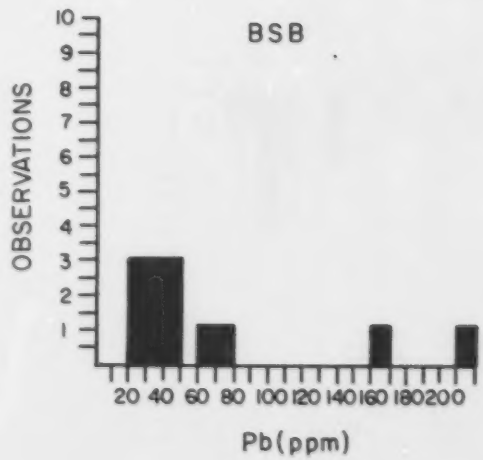

BSN
OBSERVATIONS
1 2 3 4 5 6 7 8 9 10
20 40 60 80 100 120 140 160 180 200
Cu(ppm)

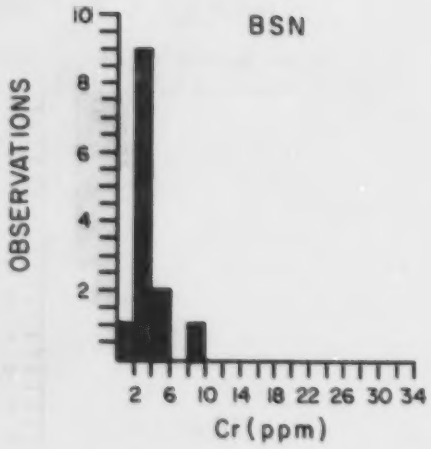

BST
OBSERVATIONS
1 2 3 4 5 6 7 8 9 10
20 40 60 80 100 120 140 160 180 200
Cu(ppm)

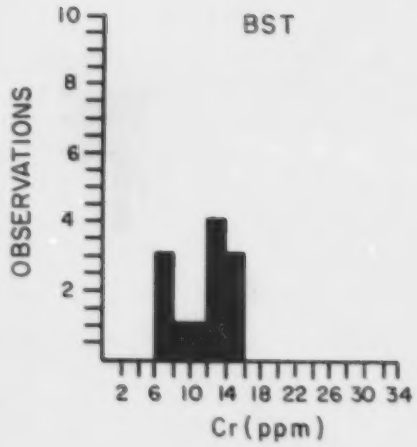

BSB
OBSERVATIONS
1 2 3 4 5 6 7 8 9 10
20 40 60 80 100 120 140 160 180 200
Cu(ppm)

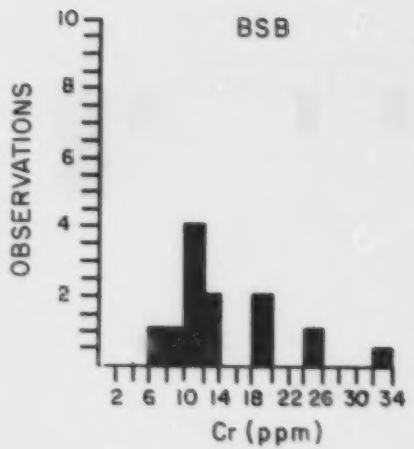

BSN
OBSERVATIONS
1 2 3 4 5 6 7 8 9 10
20 40 60 80 100 120 140 160 180 200
Pb(ppm)

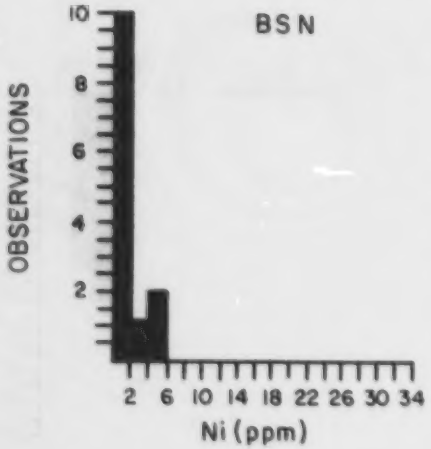

BST
OBSERVATIONS
1 2 3 4 5 6 7 8 9 10
20 40 60 80 100 120 140 160 180 200
Pb(ppm)

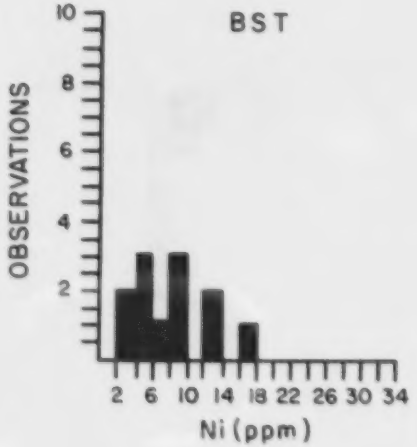

BSB
OBSERVATIONS
1 2 3 4 5 6 7 8 9 10
20 40 60 80 100 120 140 160 180 200
Pb(ppm)

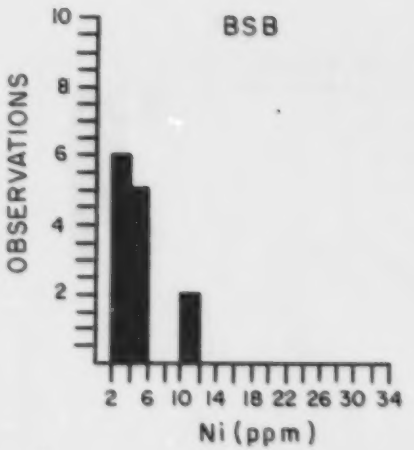

BSN
OBSERVATIONS
10
8
6
4
2
2 6 10 14 18 22 26 30 34
Cr(ppm)

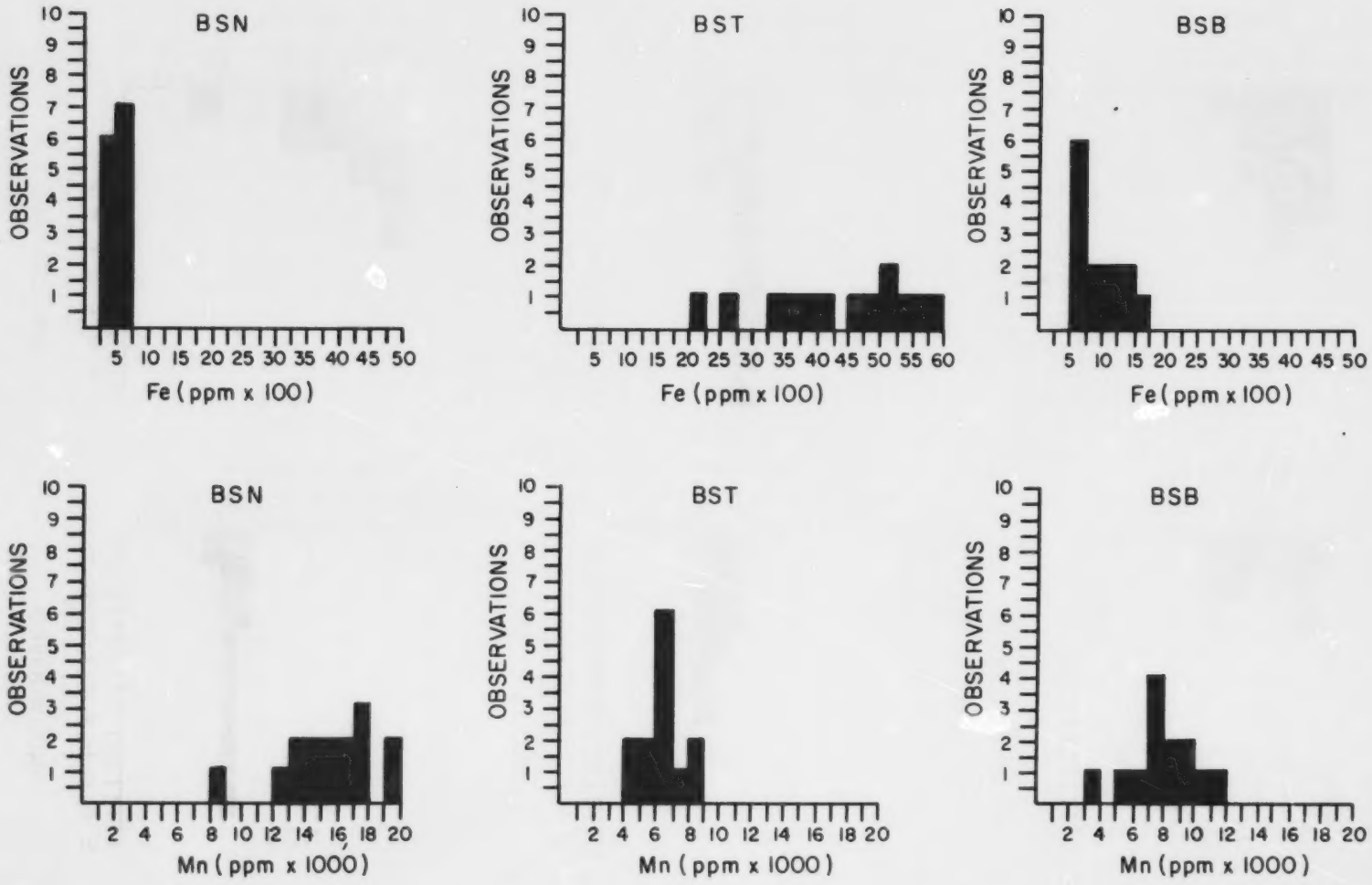

BST
OBSERVATIONS
10
8
6
4
2
2 6 10 14 18 22 26 30 34
Cr(ppm)

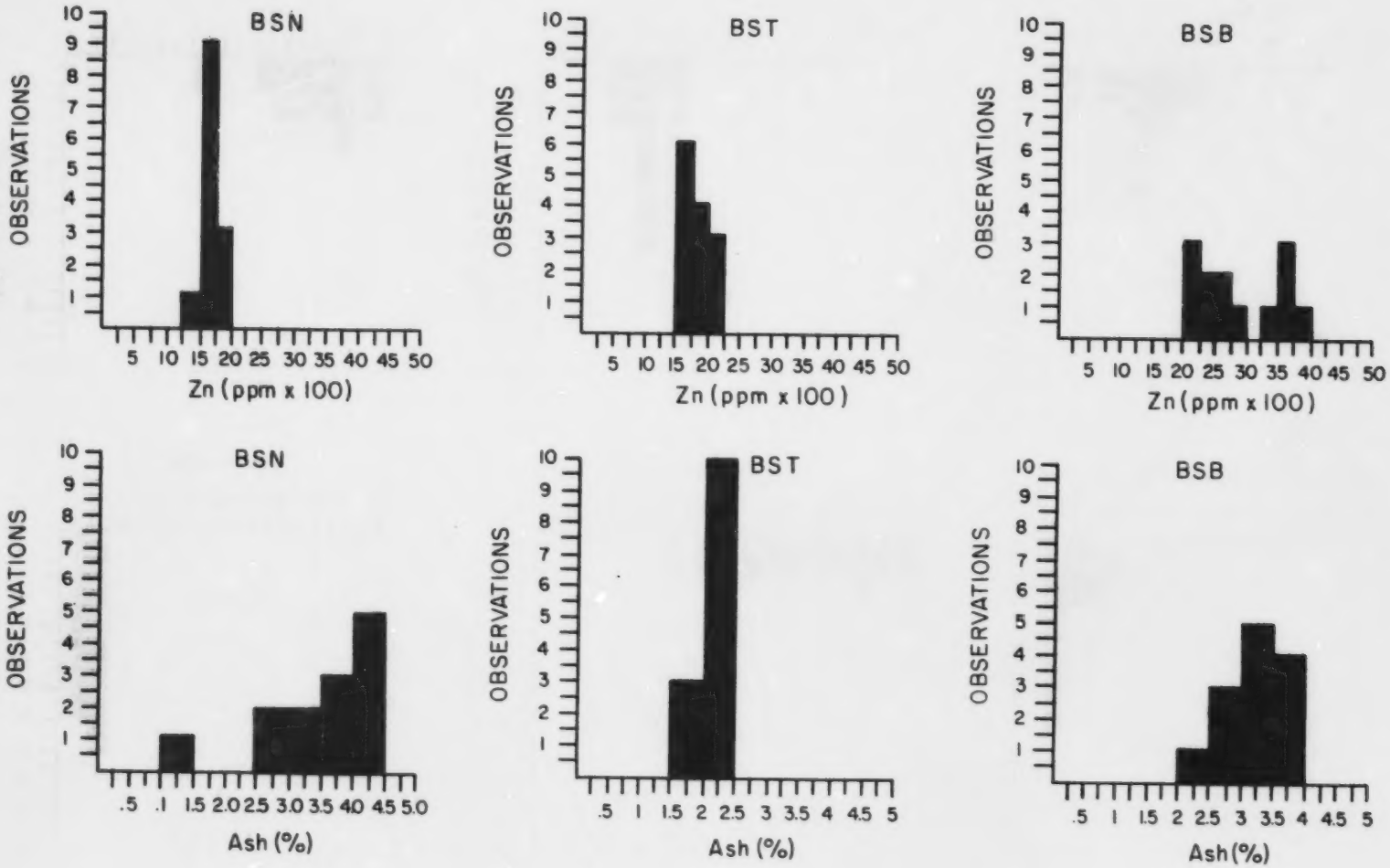

BSB
OBSERVATIONS
10
8
6
4
2
2 6 10 14 18 22 26 30 34
Cr(ppm)

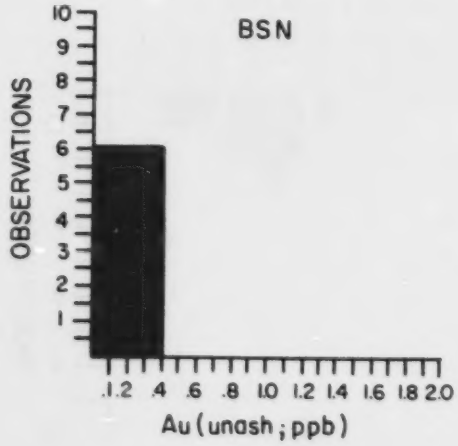

BSN
OBSERVATIONS
10
8
6
4
2
2 6 10 14 18 22 26 30 34
Ni(ppm)

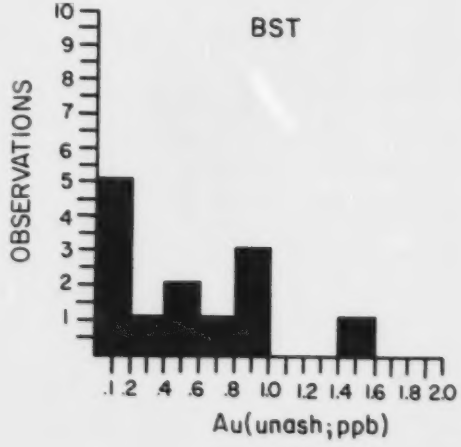

BST
OBSERVATIONS
10
8
6
4
2
2 6 10 14 18 22 26 30 34
Ni(ppm)

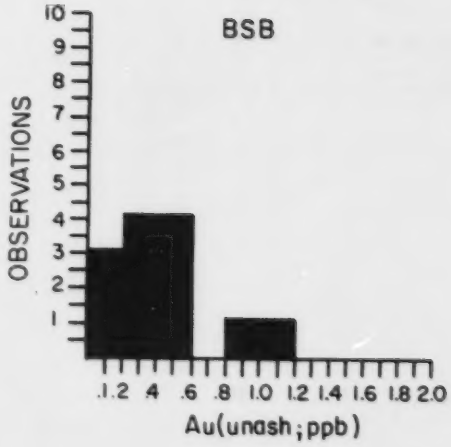

BSB
OBSERVATIONS
10
8
6
4
2
2 6 10 14 18 22 26 30 34
Ni(ppm)

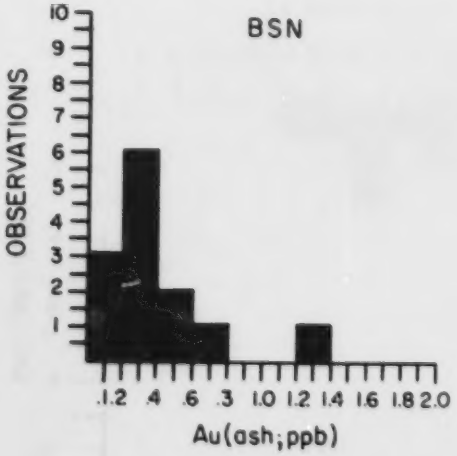

BSN
BST
BSB
OBSERVATIONS
Fe (ppm x 100)
Mn (ppm x 1000)

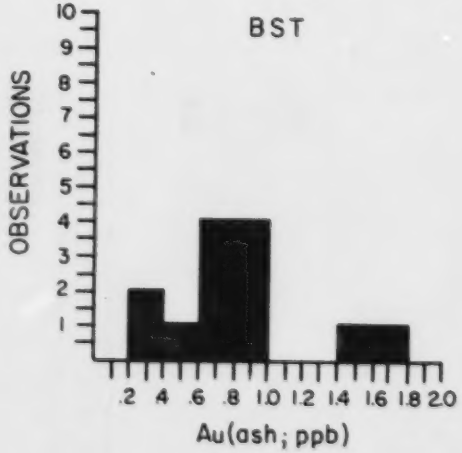

BSN
BST
BSB
OBSERVATIONS
Zn (ppm x 100)
Ash (%)

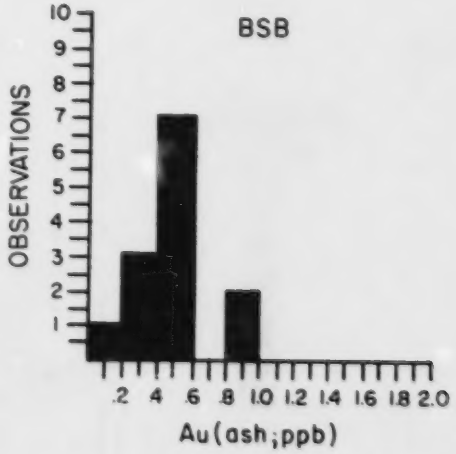

BSN
OBSERVATIONS
Au (unash ; ppb)

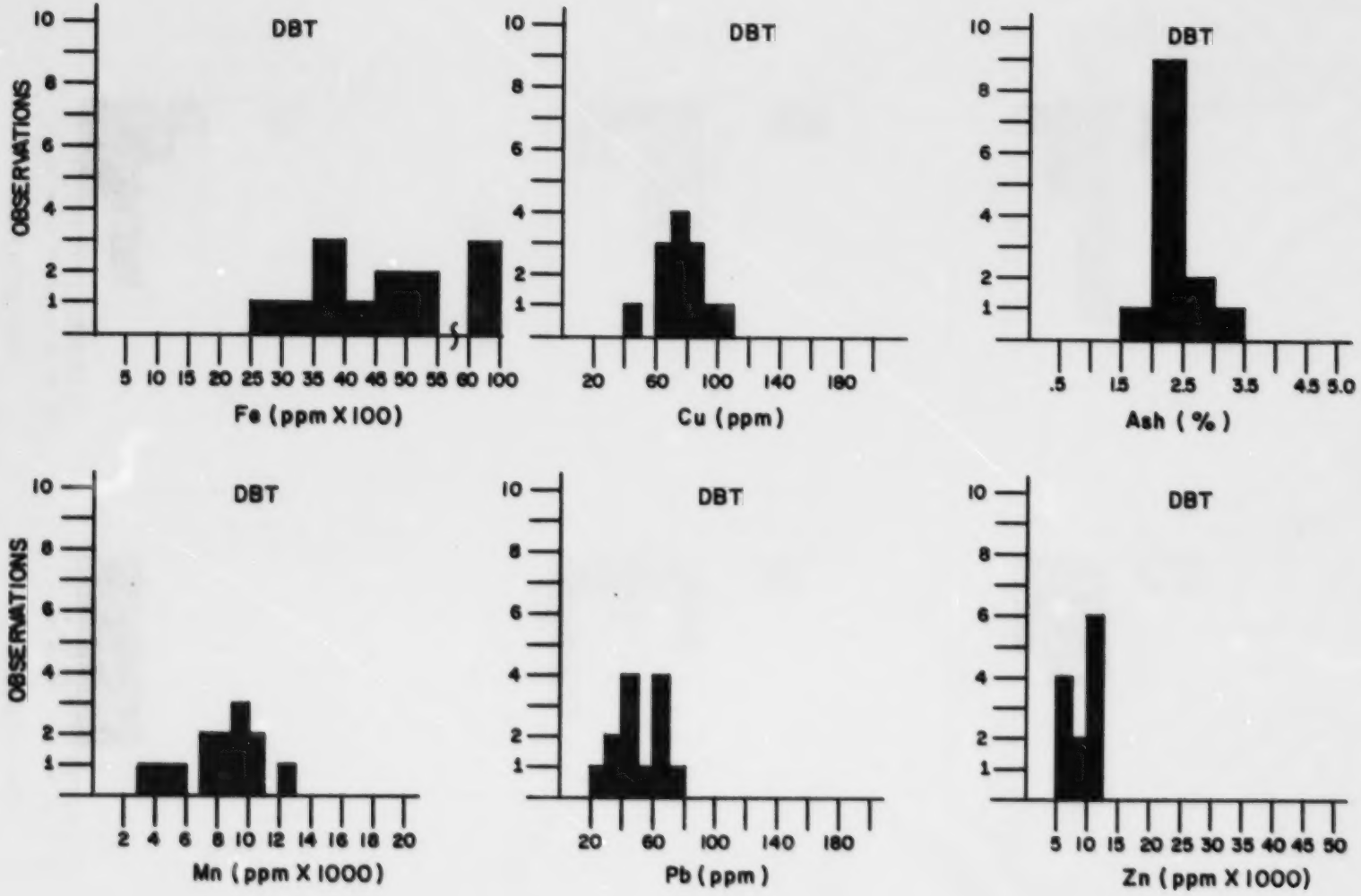

BST
OBSERVATIONS
Au(unash; ppb)

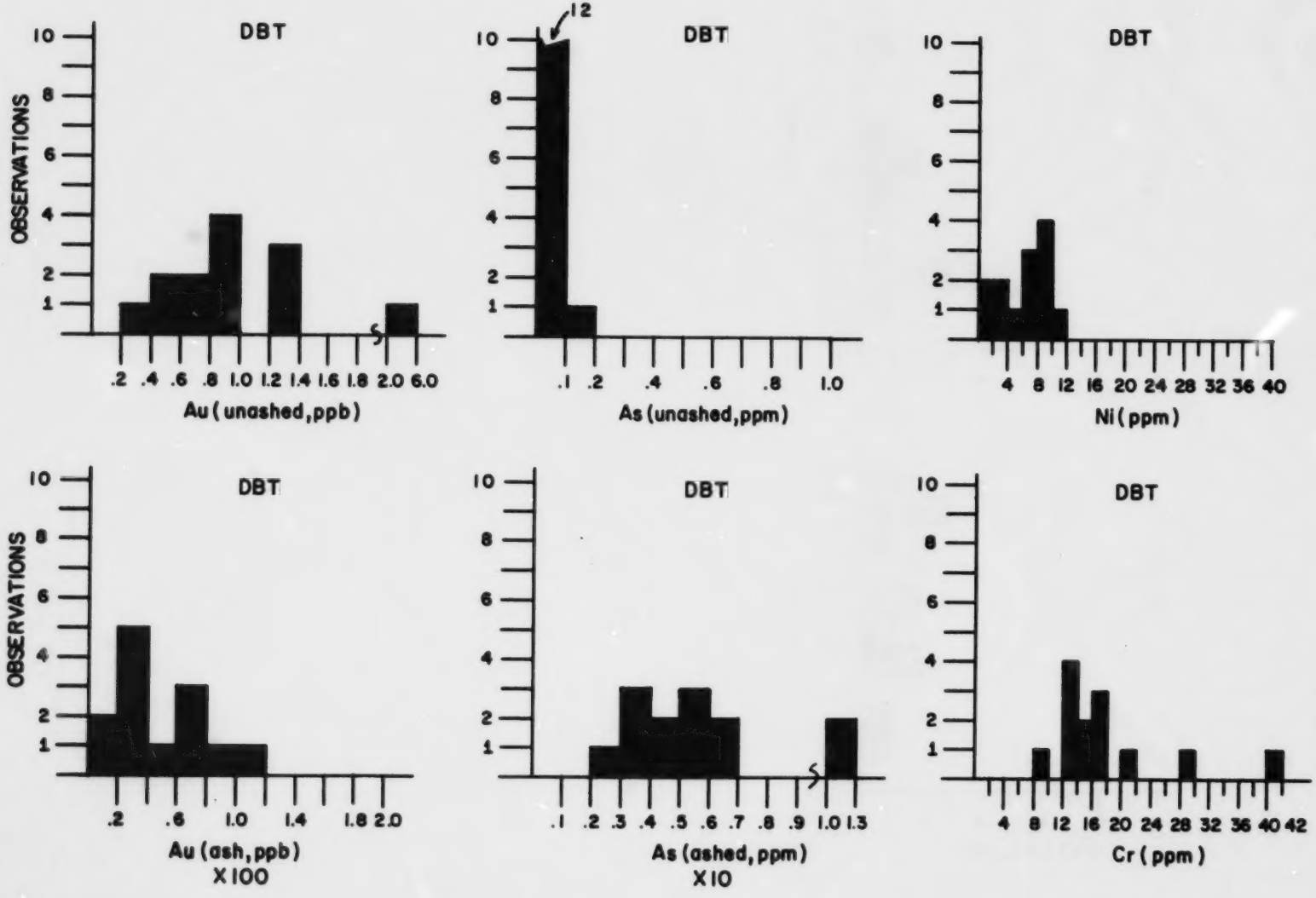

BSB
OBSERVATIONS
Au(unash; ppb)

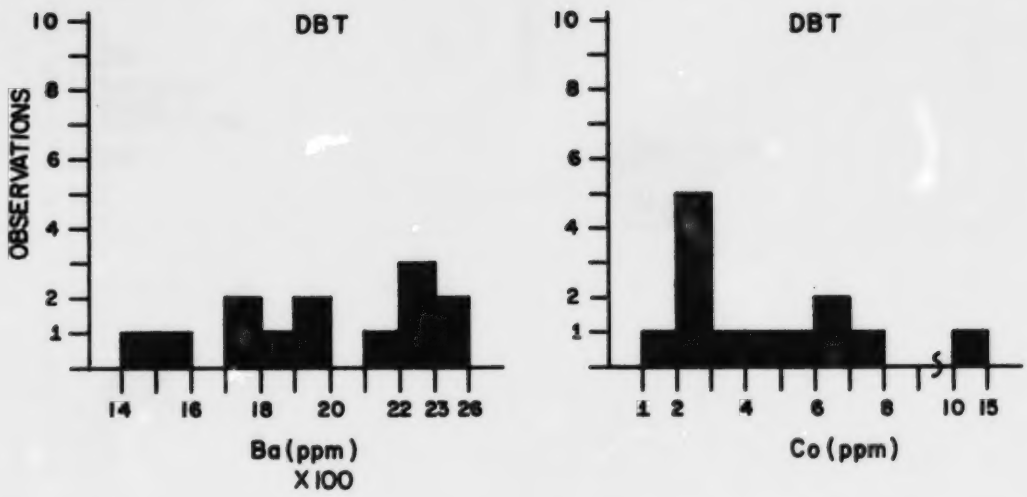

BSN
OBSERVATIONS
Au(ash; ppb)


BST
OBSERVATIONS
Au(ash; ppb)


BSB
OBSERVATIONS
Au(ash; ppb)


DBT
OBSERVATIONS
10
8
6
4
2
1
5 10 15 20 25 30 35 40 45 50 55 60 100
Fe (ppm X 100)
DBT
20 60 100 140 180
Cu (ppm)
DBT
.5 1.5 2.5 3.5 4.5 5.0
Ash (%)
DBT
OBSERVATIONS
2 4 6 8 10 12 14 16 18 20
Mn (ppm X 1000)
DBT
20 60 100 140 180
Pb (ppm)
DBT
5 10 15 20 25 30 35 40 45 50
Zn (ppm X 1000)


DBT
OBSERVATIONS
10
8
6
4
2
1
.2 .4 .6 .8 1.0 1.2 1.4 1.6 1.8 2.0 6.0
Au (unashed, ppb)
DBT
12
.1 .2 .4 .6 .8 1.0
As (unashed, ppm)
DBT
4 8 12 16 20 24 28 32 36 40
Ni (ppm)
DBT
OBSERVATIONS
.2 .6 1.0 1.4 1.8 2.0
Au (ash, ppb)
X100
DBT
.1 .2 .3 .4 .5 .6 .7 .8 .9 1.0 1.3
As (ashed, ppm)
X10
DBT
4 8 12 16 20 24 28 32 36 40 42
Cr (ppm)


DBT
OBSERVATIONS
10
8
6
4
2
1
14
16
18
20
22
23
26
Ba(ppm)
X100
DBT
10
8
6
4
2
1
1
2
4
6
8
10
15
Co(ppm)

## APPENDIX IV

## PLOTS OF NORMALIZED BLACK SPRUCE AND DWARF BIRCH GEOCHEMICAL DATA

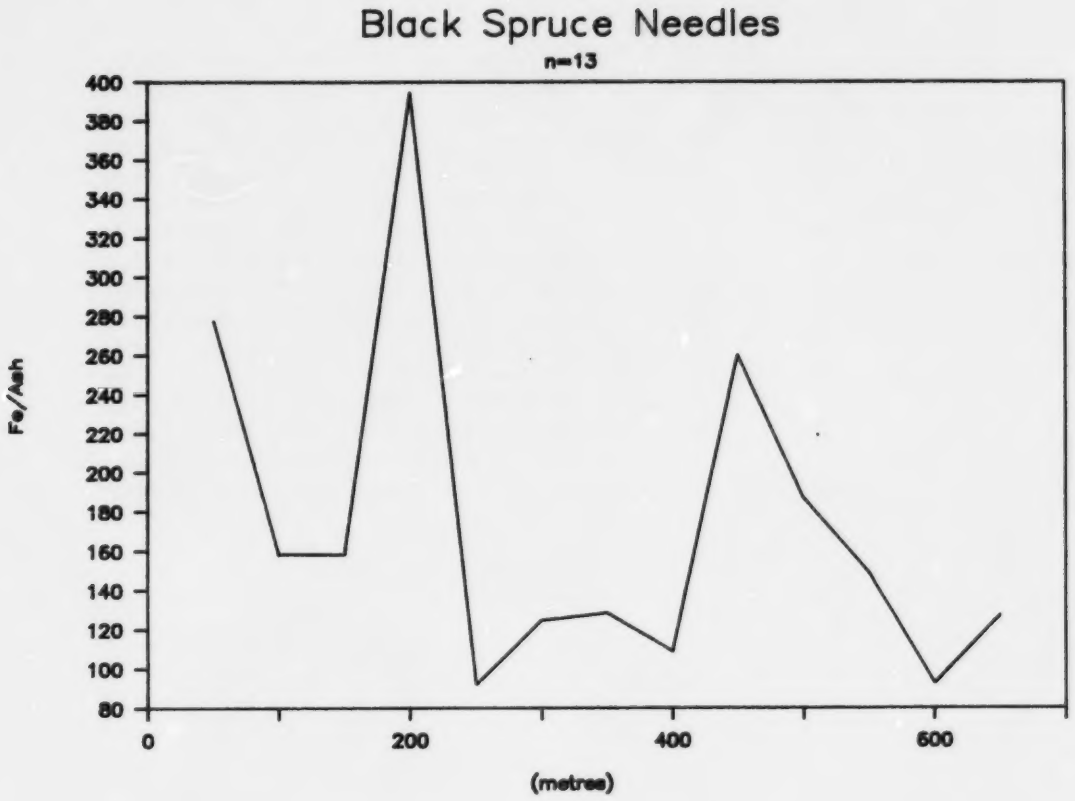
Black Spruce Needles

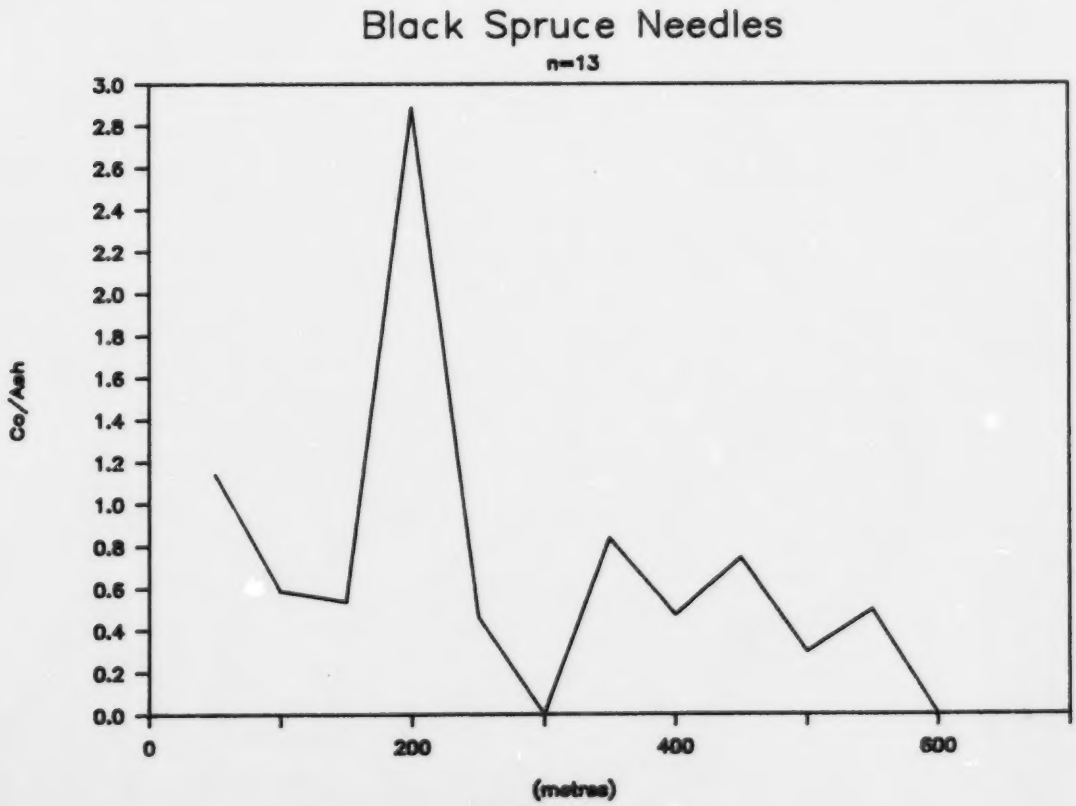
| Sample Number | Distance (m) | Cr (ppm) | Mn (ppm) | Fe (ppm) | Co (ppm) | Ni (ppm) | Cu (ppm) | Zn (ppm) | Pb (ppm) | Au (ash; ppb) | Au (dry sa; ppb) | As (dry sa; (ppm) | Ash (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N85- 1 | 50 | 4 | 17000 | 730 | 3 | 5 | 42 | 1742 | 13 | 0.2 | 0.2 | 0.1 | 2.63 |
| N85- 2 | 100 | 4 | 14800 | 540 | 2 | 4 | 36 | 1665 | 16 | 0.2 | 0.0 | 0.0 | 3.41 |
| N85- 3 | 150 | 4 | 14000 | 590 | 2 | 2 | 32 | 1546 | 12 | 0.3 | 0.3 | 0.1 | 3.73 |
| N85- 4 | 200 | 6 | 8200 | 410 | 3 | 0 | 24 | 1397 | 12 | 0.3 | 0.7 | 0.1 | 1.04 |
| N85- 5 | 250 | 2 | 7400 | 400 | 2 | 0 | 22 | 1650 | 10 | 0.2 | 0.3 | 0.0 | 4.34 |
| N85- 6 | 300 | 3 | 12300 | 500 | 0 | 0 | 26 | 1628 | 12 | 0.3 | 0.0 | 0.1 | 4.01 |
| N85- 7 | 350 | 3 | 17600 | 460 | 3 | 0 | 34 | 1553 | 15 | 1.4 | 0.0 | 0.0 | 3.58 |
| N85- 8 | 400 | 4 | 20000 | 460 | 2 | 0 | 32 | 2190 | 9 | 0.6 | 0.0 | 0.0 | 4.22 |
| N85- 9 | 450 | 4 | 16000 | 700 | 2 | 6 | 29 | 1784 | 12 | 0.3 | 0.3 | 0.1 | 2.69 |
| N85- 10 | 500 | 5 | 18000 | 630 | 1 | 0 | 39 | 1905 | 16 | 0.3 | 0.2 | 0.0 | 3.37 |
| N85- 11 | 550 | 9 | 20000 | 600 | 2 | 2 | 42 | 1610 | 11 | 0.4 | 0.3 | 0.0 | 4.03 |
| N85- 12 | 600 | 4 | 15300 | 360 | 0 | 0 | 29 | 1556 | 9 | 0.5 | 0.4 | 0.0 | 3.88 |
| N85- 13 | 650 | 4 | 13200 | 520 | 0 | 0 | 32 | 1605 | 10 | 0.7 | 0.3 | 0.0 | 4.09 |

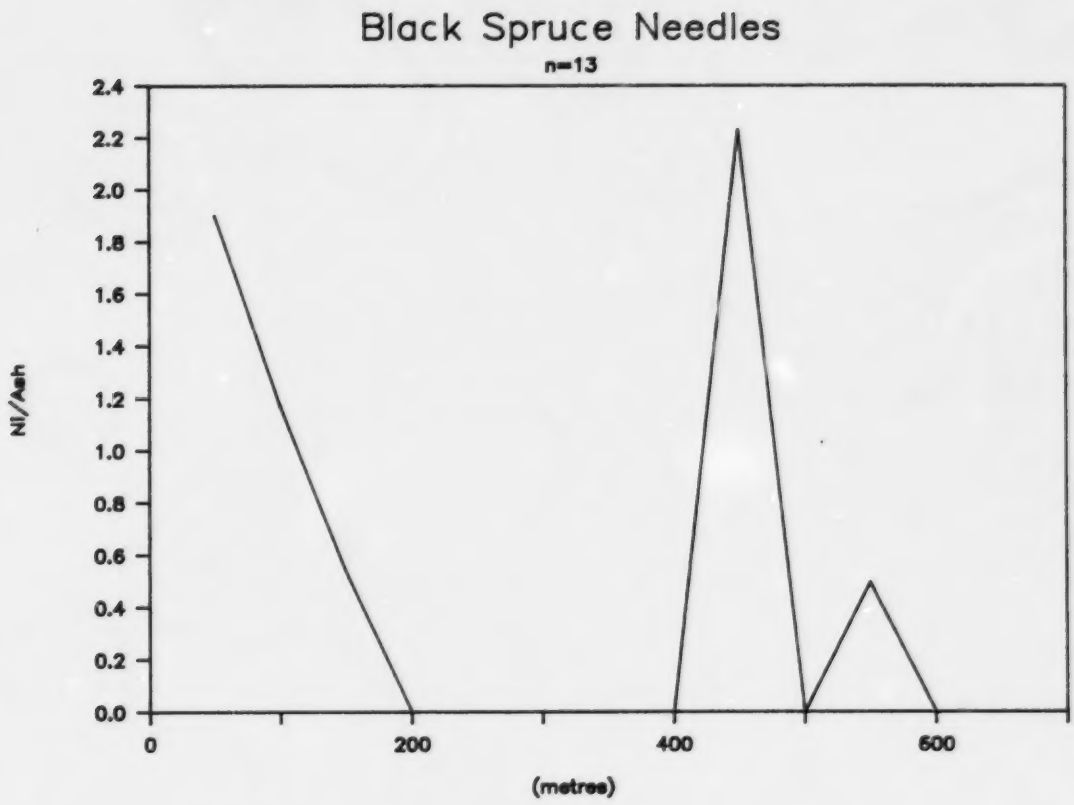
| Sample Number | Distance (m) | Cr/Ash | Mn/Ash | Fe/Ash | Co/Ash | Ni/Ash | Cu/Ash | Zn/Ash | Pb/Ash |
|---|---|---|---|---|---|---|---|---|---|
| N85- 1 | 50 | 1.52 | 6463.88 | 277.57 | 1.14 | 1.90 | 15.97 | 662.36 | 4.94 |
| N85- 2 | 100 | 1.17 | 4340.18 | 158.36 | 0.59 | 1.17 | 10.56 | 488.27 | 4.69 |
| N85- 3 | 150 | 1.07 | 3753.35 | 158.18 | 0.54 | 0.54 | 8.58 | 414.48 | 3.22 |
| N85- 4 | 200 | 5.77 | 7884.62 | 394.23 | 2.88 | 0.00 | 23.08 | 1343.27 | 11.54 |
| N85- 5 | 250 | 0.46 | 1705.07 | 92.17 | 0.46 | 0.00 | 5.07 | 380.18 | 2.30 |
| N85- 6 | 300 | 0.75 | 3067.33 | 124.69 | 0.00 | 0.00 | 6.48 | 405.99 | 2.99 |
| N85- 7 | 350 | 0.84 | 4916.20 | 128.49 | 0.84 | 0.00 | 9.50 | 433.80 | 4.19 |
| N85- 8 | 400 | 0.95 | 4739.34 | 109.00 | 0.47 | 0.00 | 7.58 | 518.96 | 2.13 |
| N85- 9 | 450 | 1.49 | 5947.96 | 260.22 | 0.74 | 2.23 | 10.78 | 663.20 | 4.46 |
| N85- 10 | 500 | 1.48 | 5341.25 | 186.94 | 0.30 | 0.00 | 11.57 | 565.28 | 4.75 |
| N85- 11 | 550 | 2.23 | 4962.78 | 148.88 | 0.50 | 0.50 | 10.42 | 399.50 | 2.73 |
| N85- 12 | 600 | 1.03 | 3943.30 | 92.78 | 0.00 | 0.00 | 7.47 | 401.03 | 2.32 |
| N85- 13 | 650 | 0.98 | 3227.38 | 127.14 | 0.00 | 0.00 | 7.82 | 392.42 | 2.44 |

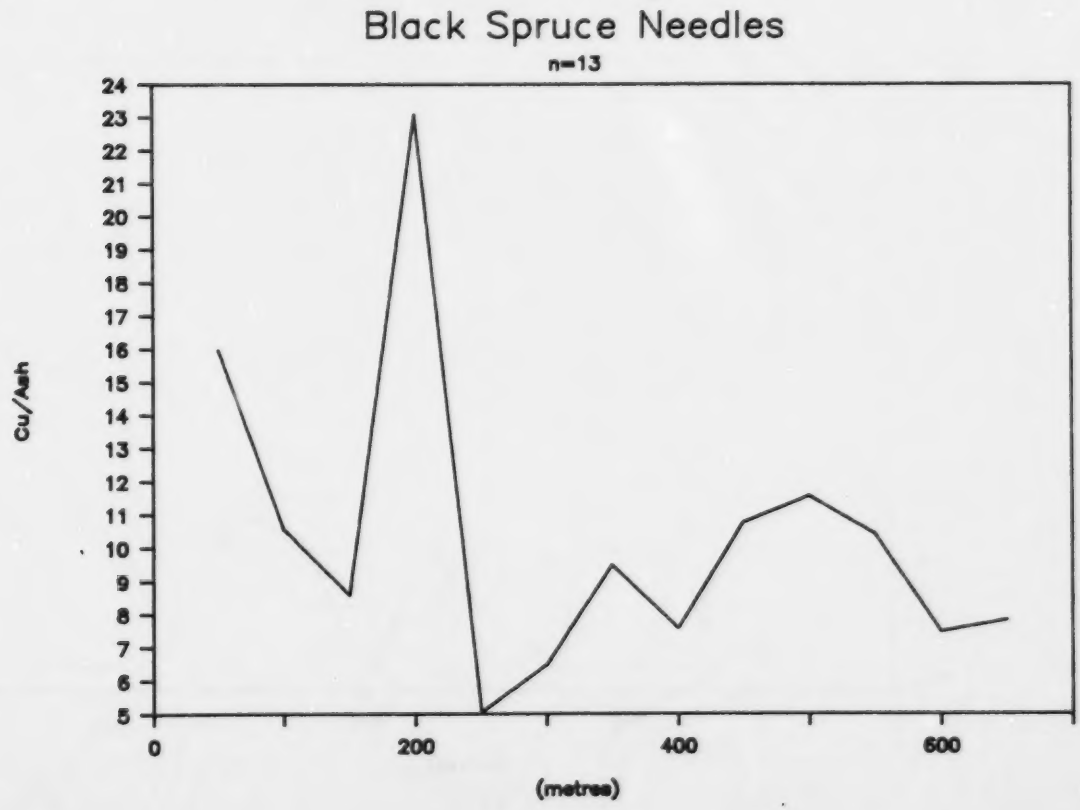
| Sample Number | Distance (m) | Cr/Mn | Fe/Mn | Co/Mn | Ni/Mn | Cu/Mn | Zn/Mn | Pb/Mn |
|---|---|---|---|---|---|---|---|---|
| N85- 1 | 50 | 0.00024 | 0.0429 | 0.0002 | 0.00029 | 0.00247 | 0.10247 | 0.00076 |
| N85- 2 | 100 | 0.00027 | 0.0365 | 0.0001 | 0.00027 | 0.00243 | 0.11250 | 0.00108 |
| N85- 3 | 150 | 0.00029 | 0.0421 | 0.0001 | 0.00014 | 0.00229 | 0.11043 | 0.00086 |
| N85- 4 | 200 | 0.00073 | 0.0500 | 0.0004 | 0.00000 | 0.00293 | 0.17037 | 0.00146 |
| N85- 5 | 250 | 0.00027 | 0.0541 | 0.0003 | 0.00000 | 0.00297 | 0.22297 | 0.00135 |
| N85- 6 | 300 | 0.00024 | 0.0407 | 0.0000 | 0.00000 | 0.00211 | 0.13236 | 0.00098 |
| N85- 7 | 350 | 0.00017 | 0.0261 | 0.0002 | 0.00000 | 0.00193 | 0.08824 | 0.00085 |
| N85- 8 | 400 | 0.00020 | 0.0230 | 0.0001 | 0.00000 | 0.00160 | 0.10950 | 0.00045 |
| N85- 9 | 450 | 0.00025 | 0.0438 | 0.0001 | 0.00038 | 0.00181 | 0.11150 | 0.00075 |
| N85- 10 | 500 | 0.00028 | 0.0350 | 0.0001 | 0.00000 | 0.00217 | 0.10583 | 0.00089 |
| N85- 11 | 550 | 0.00045 | 0.0300 | 0.0001 | 0.00010 | 0.00210 | 0.08050 | 0.00055 |
| N85- 12 | 600 | 0.00026 | 0.0235 | 0.0000 | 0.00000 | 0.00190 | 0.10170 | 0.00059 |
| N85- 13 | 650 | 0.00030 | 0.0394 | 0.0000 | 0.00000 | 0.00242 | 0.12159 | 0.00076 |

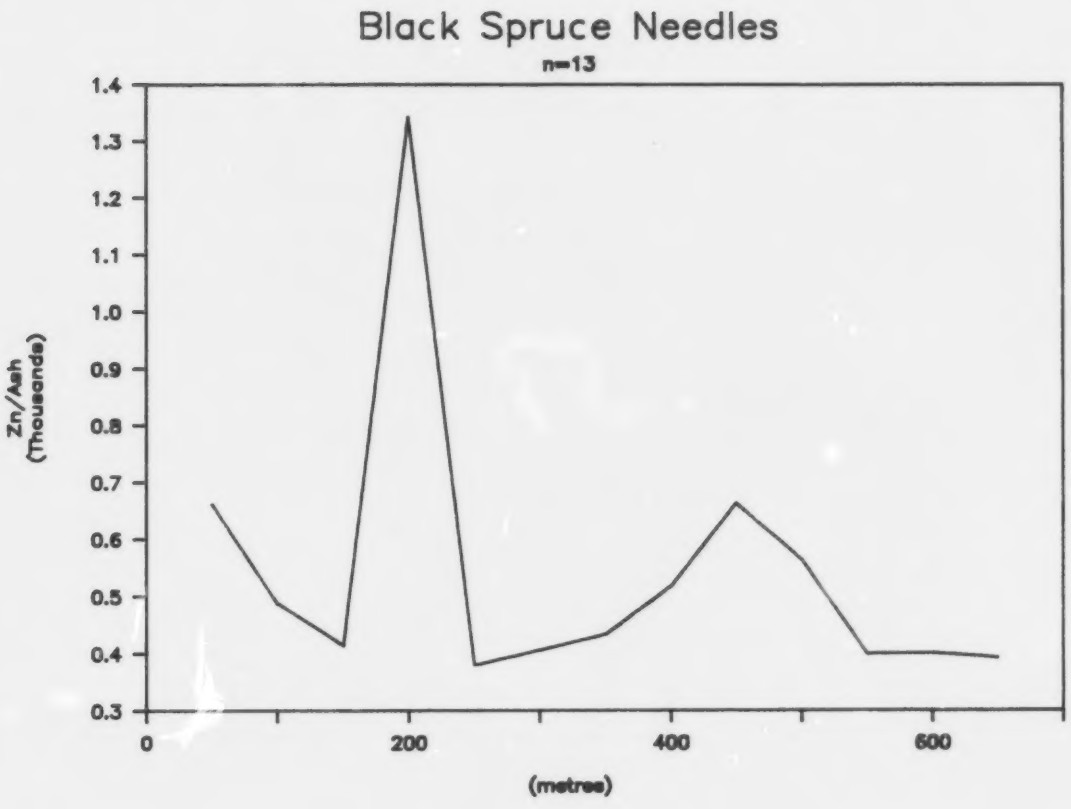
| Sample Number | Distance (m) | (Cr/Ash) /Mn | (Fe/Ash) /Mn | (Co/Ash) /Mn | (Ni/Ash) /Mn | (Cu/Ash) /Mn | (Zn/Ash) /Mn | (Pb/Ash) /Mn |
|---|---|---|---|---|---|---|---|---|
| N85- 1 | 50 | 0.00009 | 0.01633 | 0.00007 | 0.00011 | 0.00094 | 0.03896 | 0.00029 |
| N85- 2 | 100 | 0.00008 | 0.01070 | 0.00004 | 0.00008 | 0.00071 | 0.03299 | 0.00032 |
| N85- 3 | 150 | 0.00008 | 0.01130 | 0.00004 | 0.00004 | 0.00061 | 0.02961 | 0.00023 |
| N85- 4 | 200 | 0.00070 | 0.04808 | 0.00035 | 0.00000 | 0.00281 | 0.16381 | 0.00141 |
| N85- 5 | 250 | 0.00006 | 0.01245 | 0.00006 | 0.00000 | 0.00069 | 0.05138 | 0.00031 |
| N85- 6 | 300 | 0.00006 | 0.01014 | 0.00000 | 0.00000 | 0.00053 | 0.03301 | 0.00024 |
| N85- 7 | 350 | 0.00005 | 0.00730 | 0.00005 | 0.00000 | 0.00054 | 0.02465 | 0.00024 |
| N85- 8 | 400 | 0.00005 | 0.00545 | 0.00002 | 0.00000 | 0.00038 | 0.02595 | 0.00011 |
| N85- 9 | 450 | 0.00009 | 0.01626 | 0.00005 | 0.00014 | 0.00067 | 0.04145 | 0.00028 |
| N85- 10 | 500 | 0.00008 | 0.01039 | 0.00002 | 0.00000 | 0.00064 | 0.03140 | 0.00026 |
| N85- 11 | 550 | 0.00011 | 0.00744 | 0.00002 | 0.00002 | 0.00052 | 0.01998 | 0.00014 |
| N85- 12 | 600 | 0.00007 | 0.00606 | 0.00000 | 0.00000 | 0.00049 | 0.02621 | 0.00015 |
| N85- 13 | 650 | 0.00007 | 0.00963 | 0.00000 | 0.00000 | 0.00059 | 0.02973 | 0.00019 |

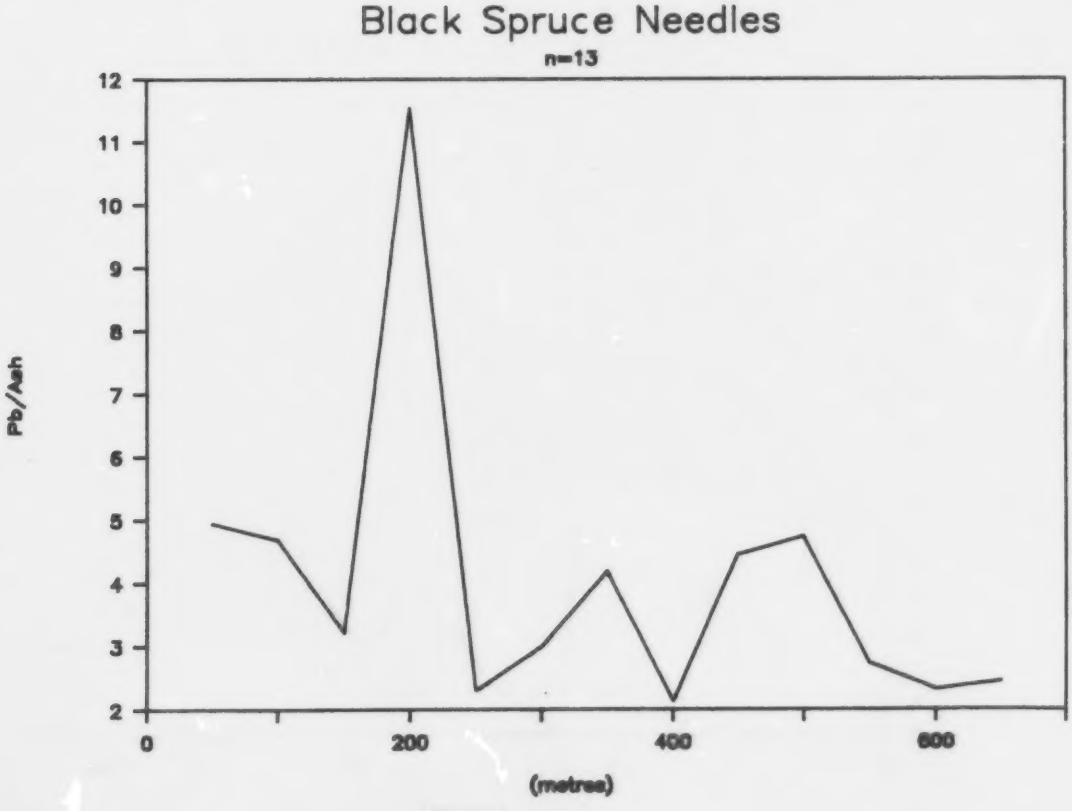

Black Spruce Needles
n=13
Fe/Ash
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
0
200
400
600
(metres)

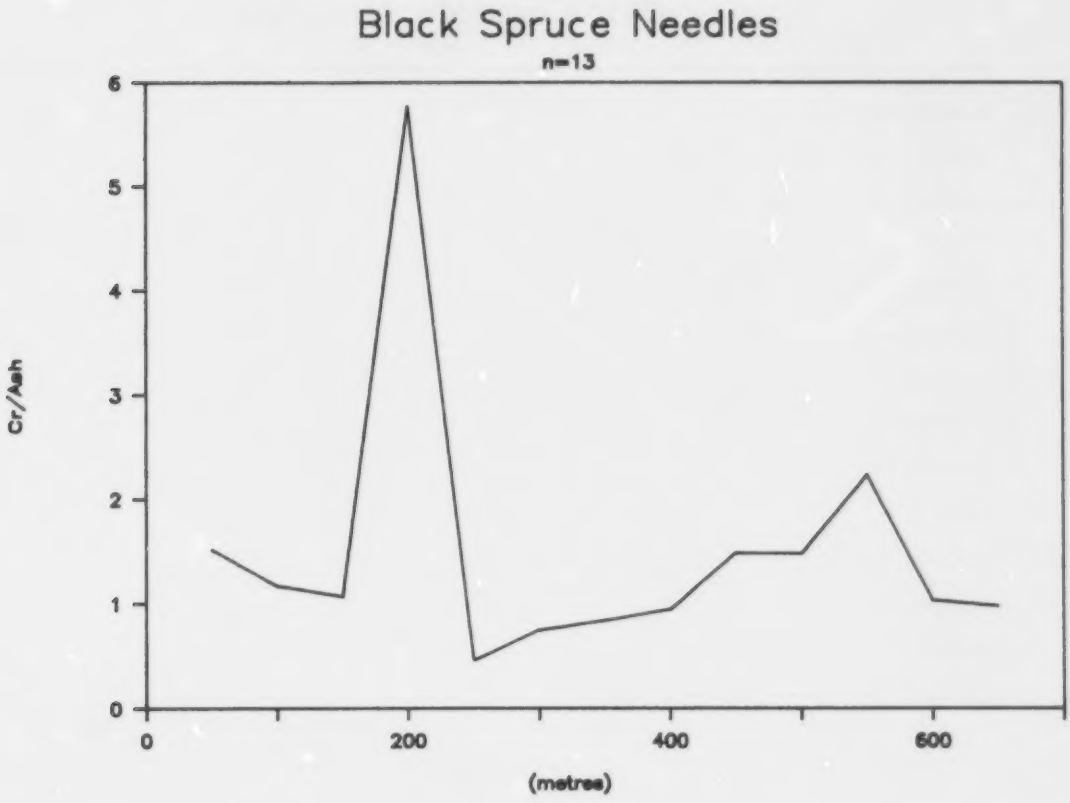

Black Spruce Needles
n=13
Co/Ash
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
200
400
600
(metres)

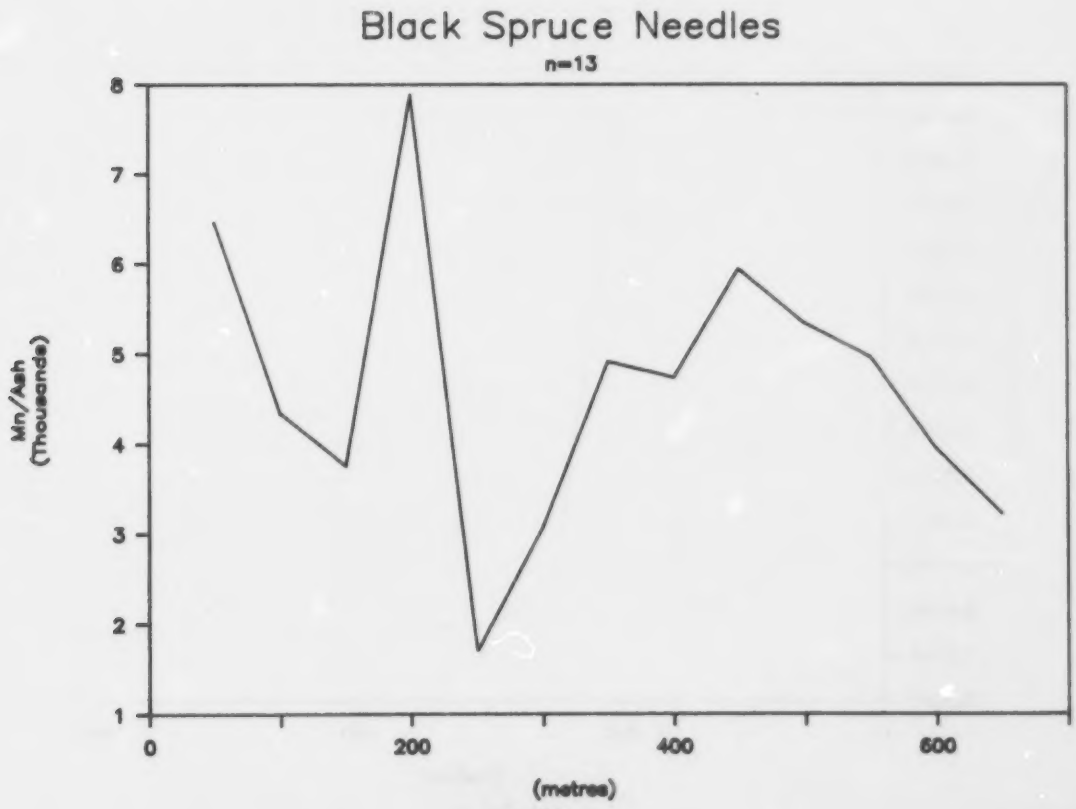

Black Spruce Needles
n=13
Ni/Ash
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
200
400
600
(metres)

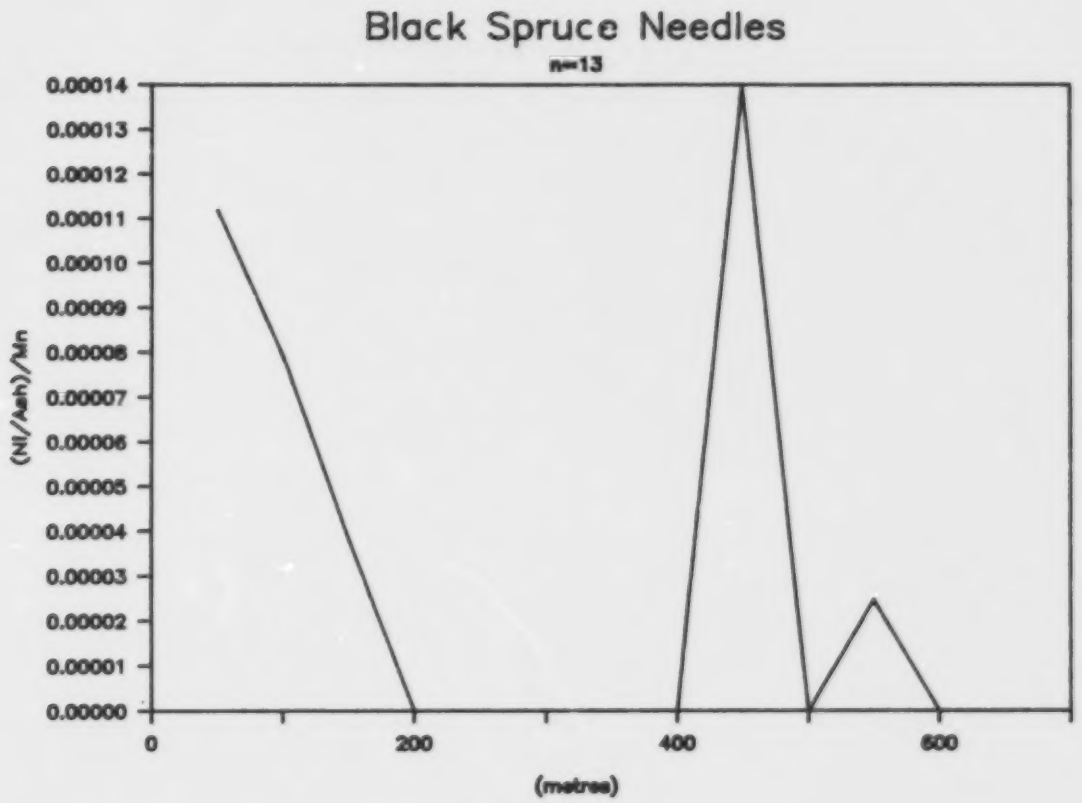

Black Spruce Needles
n=13
Cu/Ash
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
0
200
400
600
(metres)

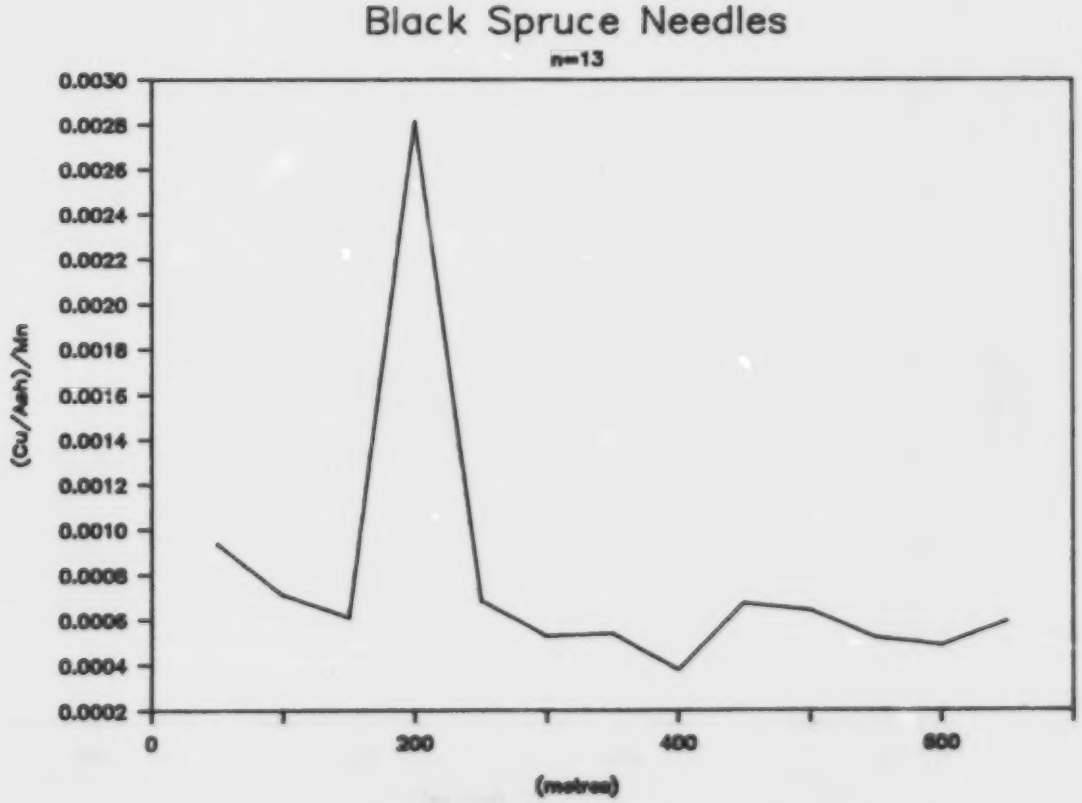

Black Spruce Needles
n=13
Zn/Ash
(Thousands)
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0
200
400
600
(metres)

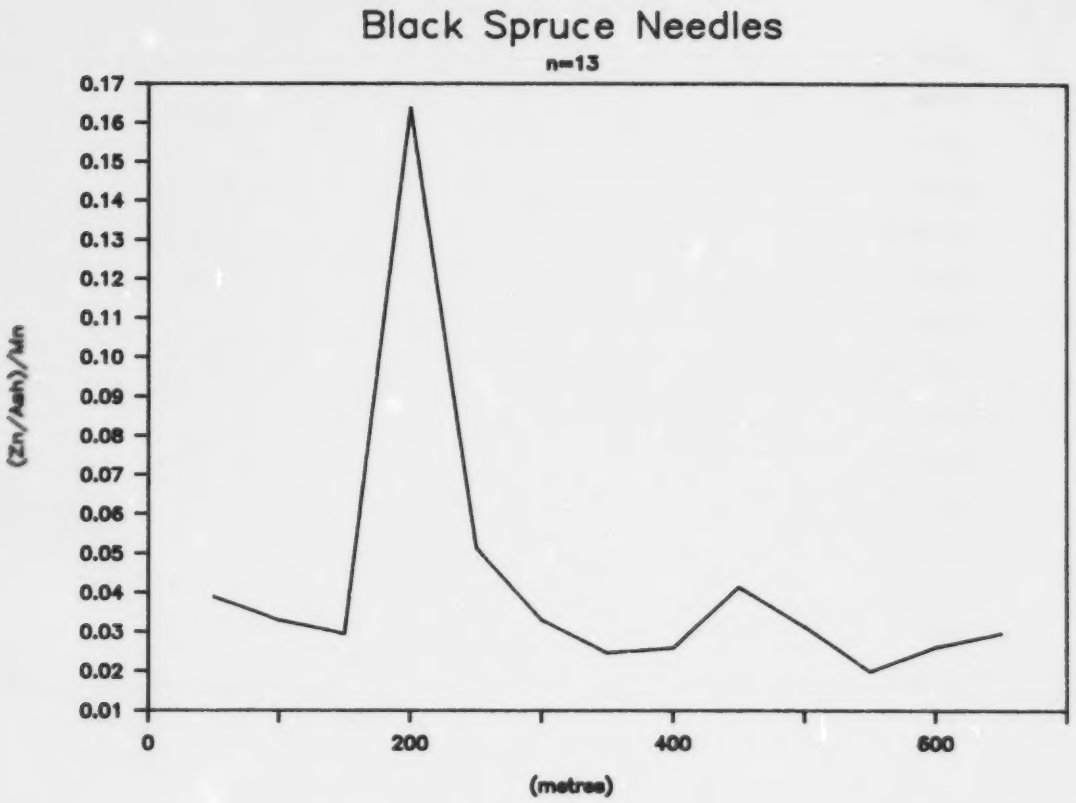

Black Spruce Needles
n=13
Pb/Ash
12
11
10
9
8
7
6
5
4
3
2
0
200
400
600
(metres)

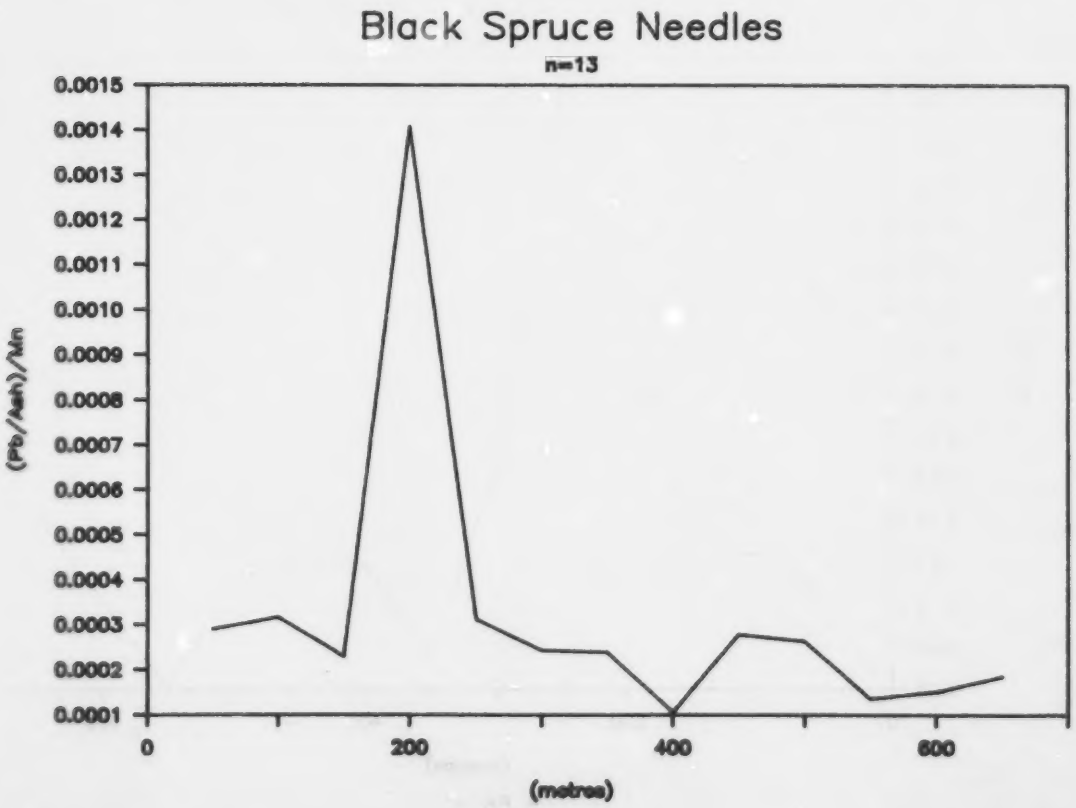

Black Spruce Needles
n=13
Cr/Ash
0
1
2
3
4
5
6
0
200
400
600
(metres)

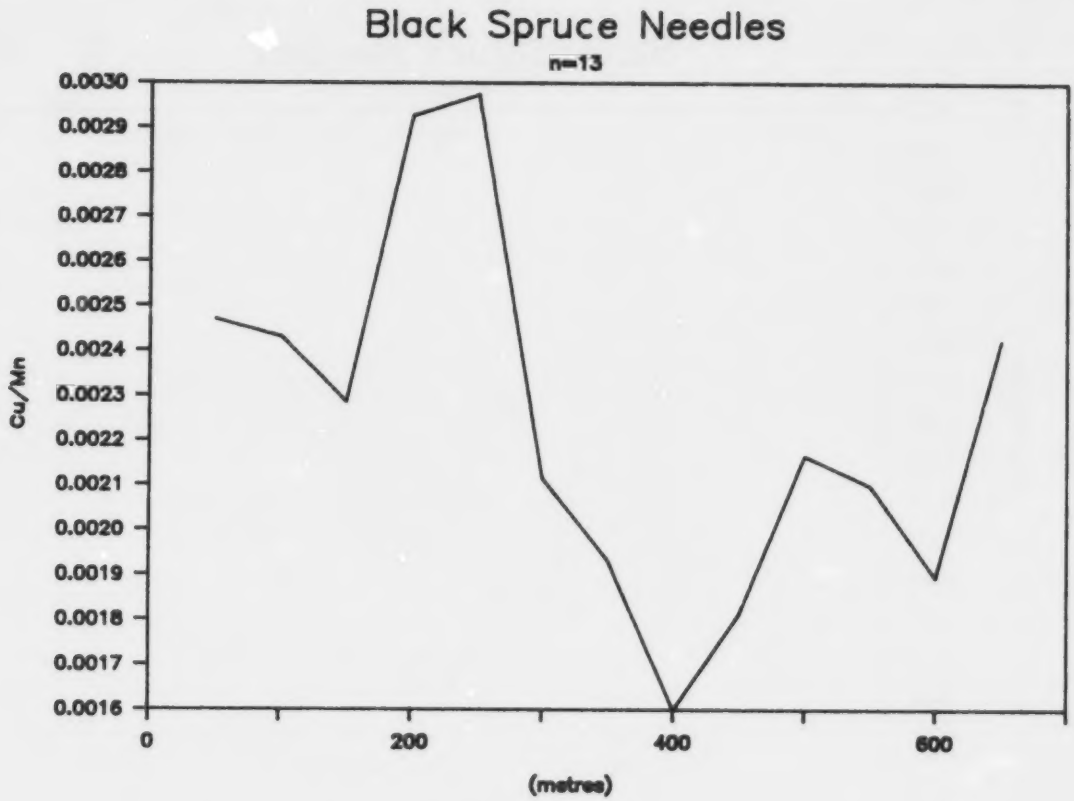

Black Spruce Needles
n=13
Mn/Ash
(Thousands)
1
2
3
4
5
6
7
8
0
200
400
600
(metres)

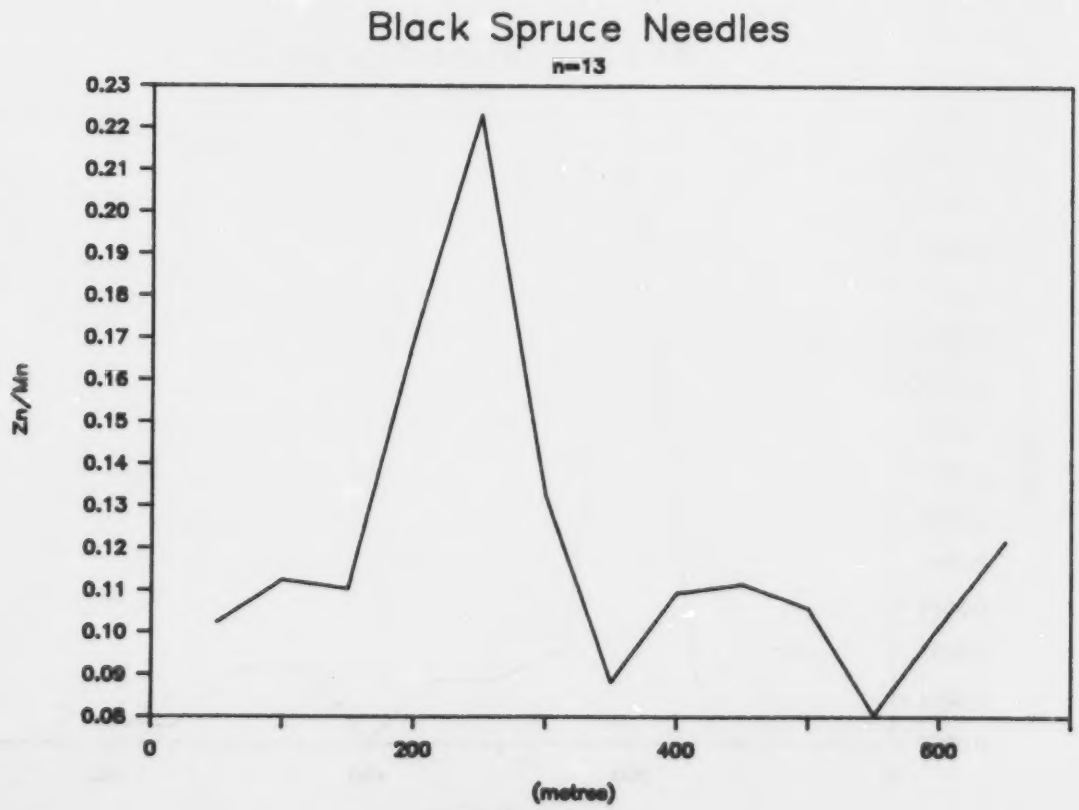

Black Spruce Needles
n=13
0.00014
0.00013
0.00012
0.00011
0.00010
0.00009
0.00008
0.00007
0.00006
0.00005
0.00004
0.00003
0.00002
0.00001
0.00000
(Ni/Ash)/Mn
0
200
400
600
(metres)

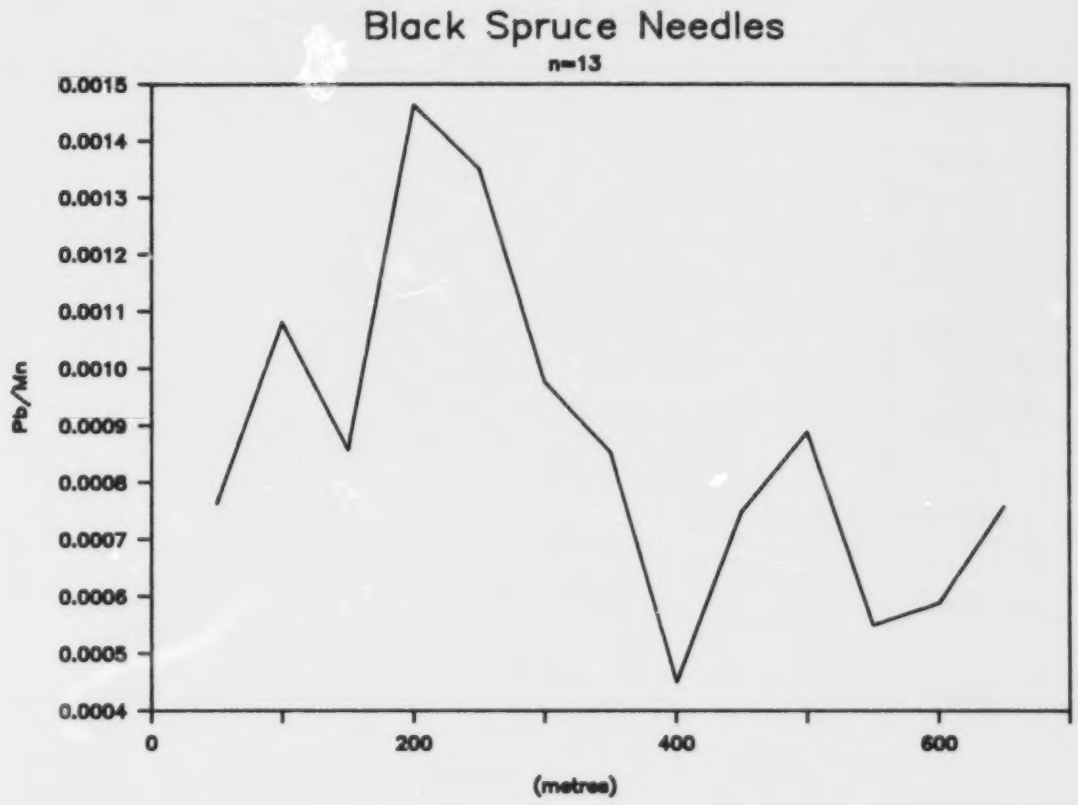

Black Spruce Needles
n=13
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
(Cu/Ash)/Mn
0
200
400
600
(metres)

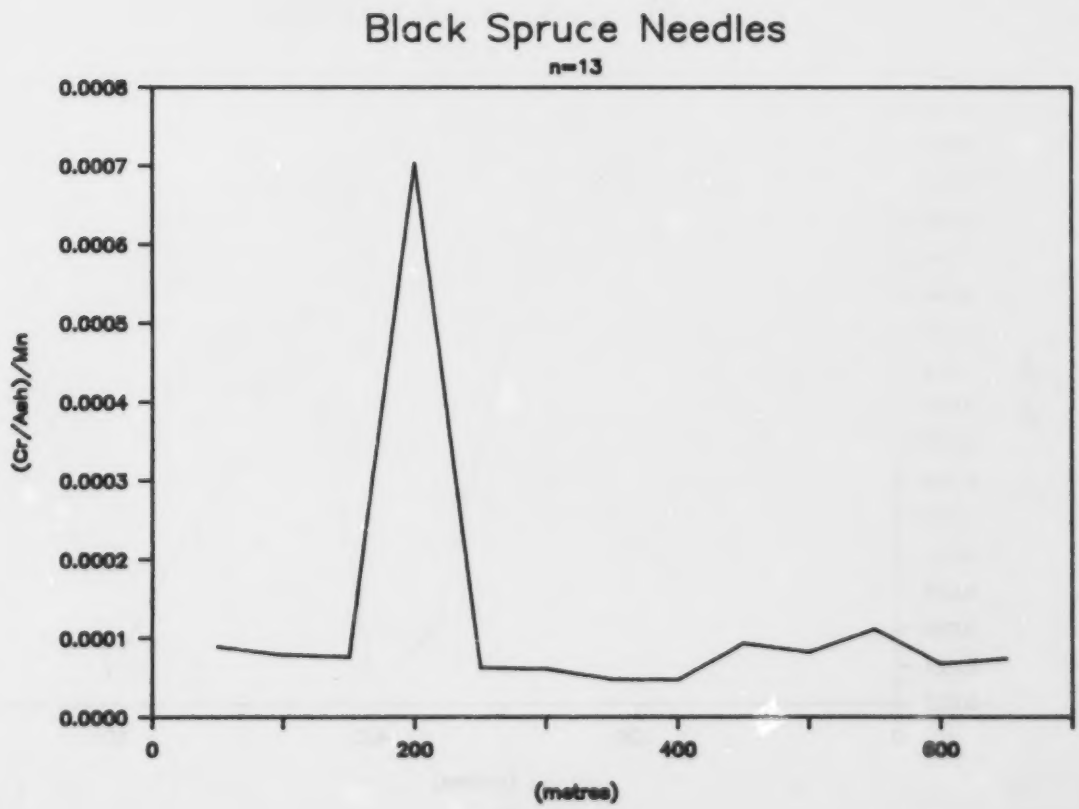

Black Spruce Needles
n=13
(Zn/Ash)/Mn
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
200
400
600
(metres)

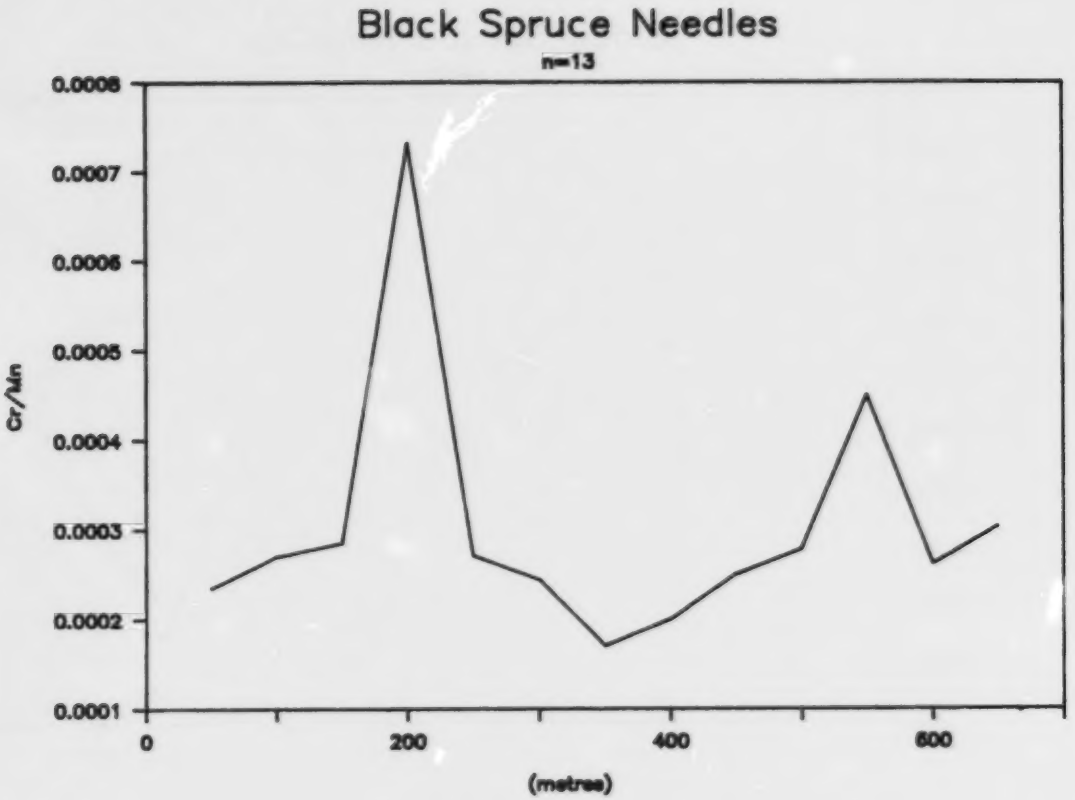

Black Spruce Needles
n=13
(Pb/Ash)/Mn
0.0015
0.0014
0.0013
0.0012
0.0011
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
200
400
600
(metres)

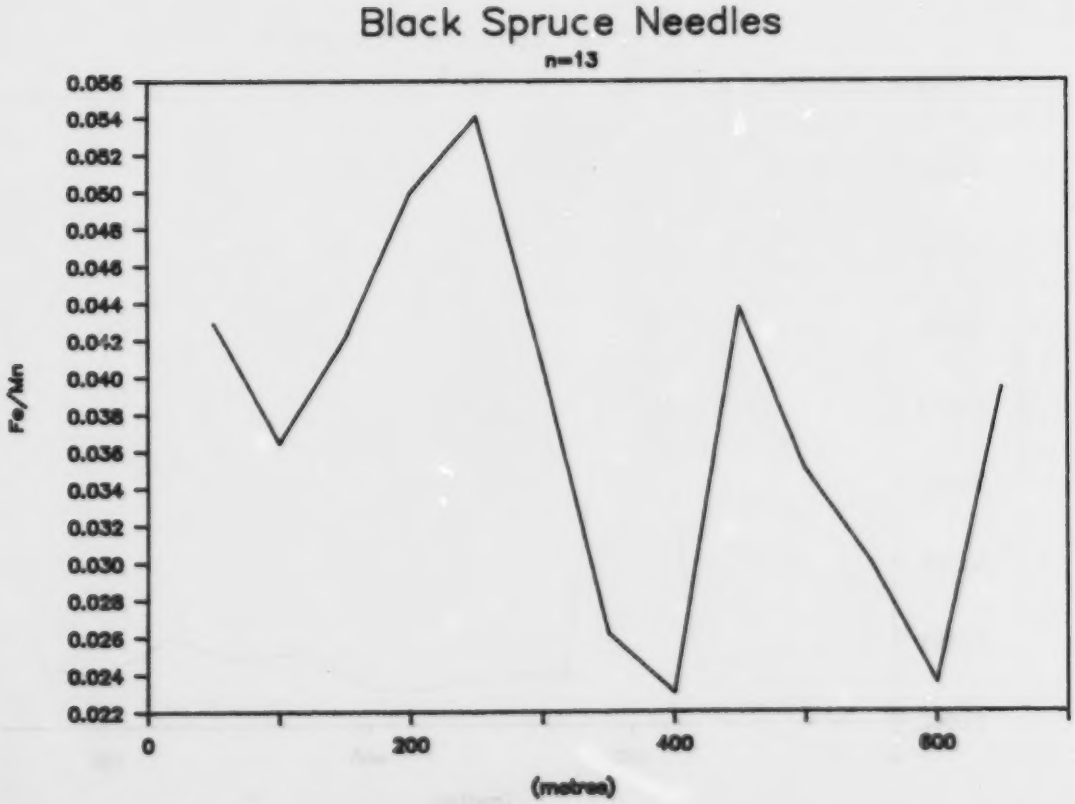

Black Spruce Needles
n=13
Cu/Mn
0.0030
0.0029
0.0028
0.0027
0.0026
0.0025
0.0024
0.0023
0.0022
0.0021
0.0020
0.0019
0.0018
0.0017
0.0016
0
200
400
600
(metres)

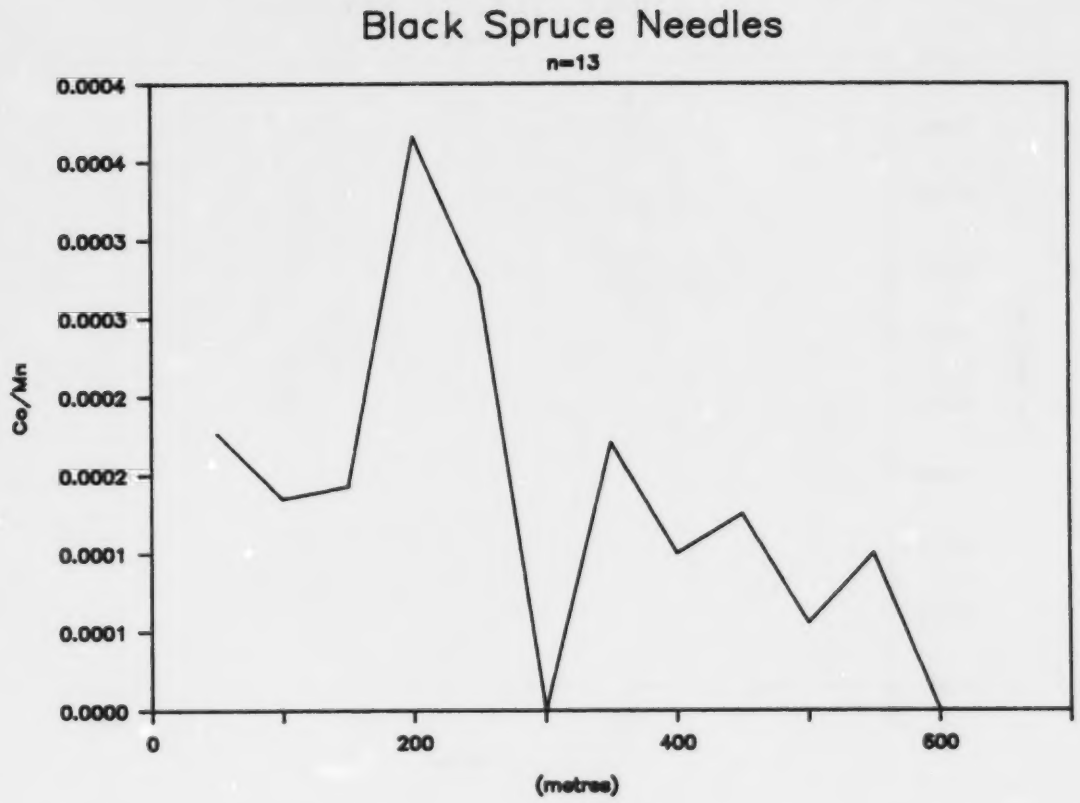

Black Spruce Needles
n=13
Zn/Mn
0.23
0.22
0.21
0.20
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0
200
400
600
(metres)

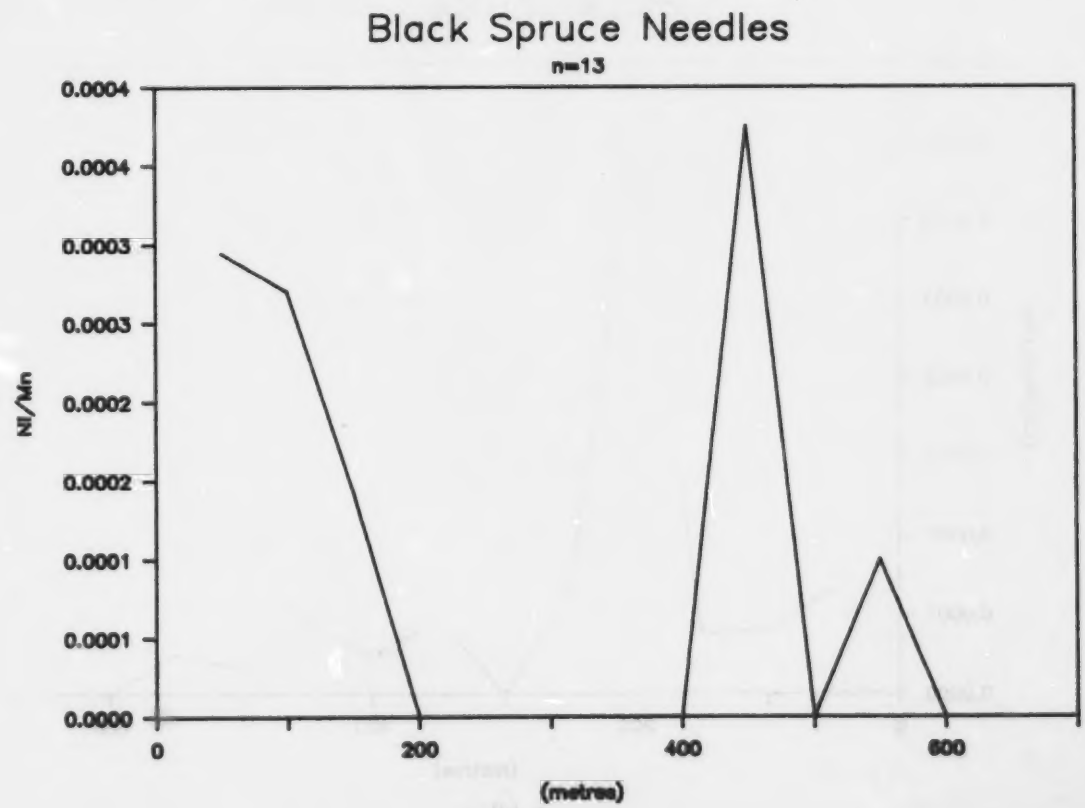

Black Spruce Needles
n=13
Pb/Mn
0.0015
0.0014
0.0013
0.0012
0.0011
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0
200
400
600
(metres)

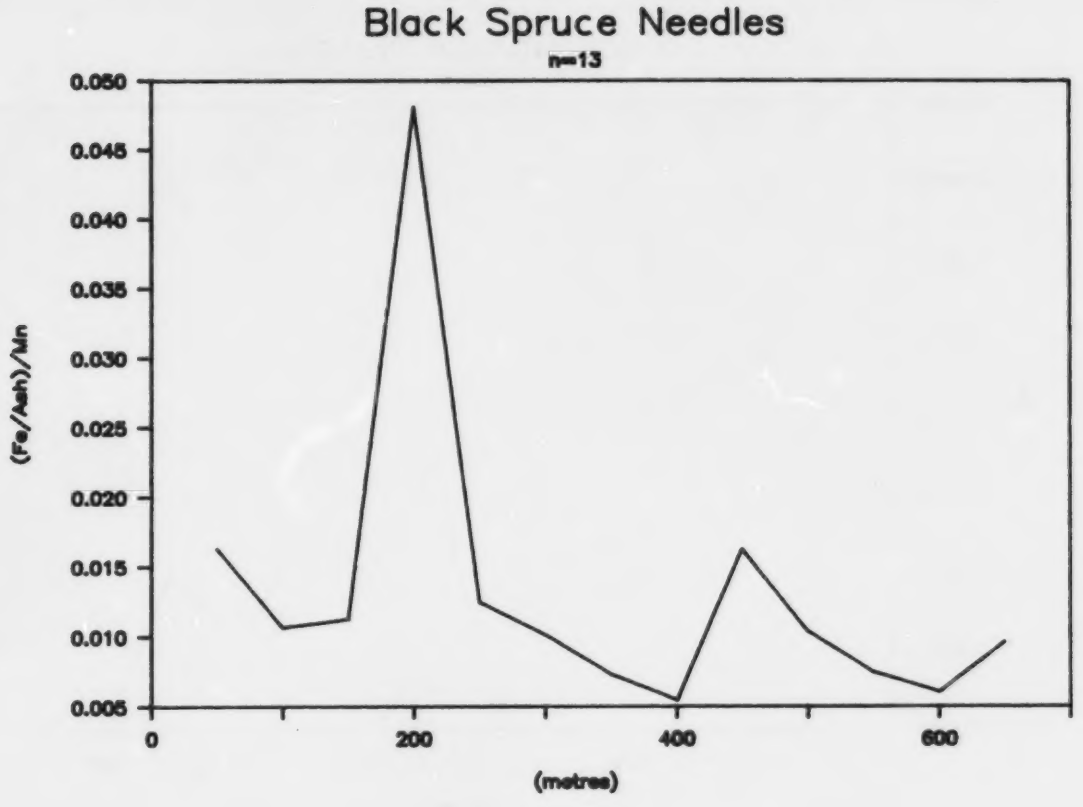

Black Spruce Needles
n=13
(Cr/Ash)/Mn
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
0
200
400
600
(metres)

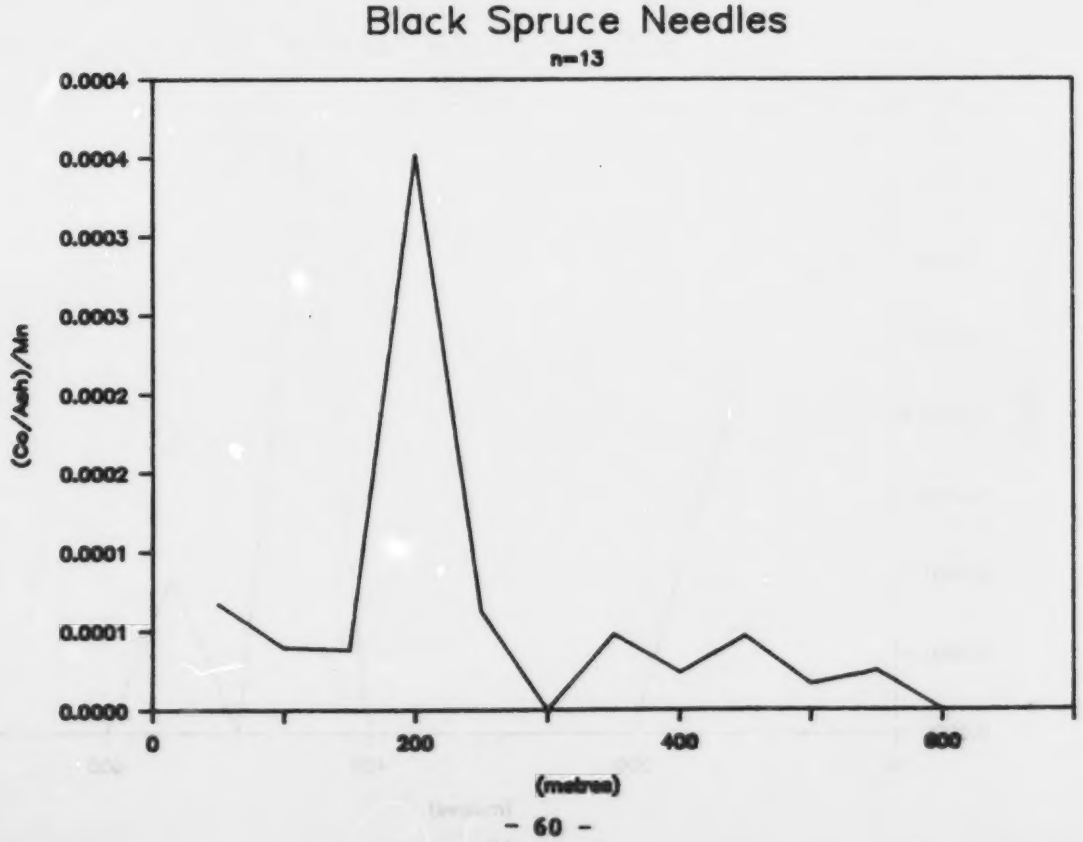

Black Spruce Needles
n=13
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
Cr/Mn
0
200
400
600
(metres)


Black Spruce Needles
n=13
0.056
0.054
0.052
0.050
0.048
0.046
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
Fe/Mn
0
200
400
600
(metres)


Black Spruce Needles
n=13
Co/Mn
0.0004
0.0004
0.0003
0.0003
0.0002
0.0002
0.0001
0.0001
0.0000
0
200
400
600
(metres)


Black Spruce Needles
n=13
Ni/Mn
0.0004
0.0004
0.0003
0.0003
0.0002
0.0002
0.0001
0.0001
0.0000
0
200
400
600
(metres)


Black Spruce Needles
n=13
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
(Fe/Ash)/Mn
0
200
400
600
(metres)


Black Spruce Needles
n=13
0.0004
0.0004
0.0003
0.0003
0.0002
0.0002
0.0001
0.0001
0.0000
(Co/Ash)/Mn
0
200
400
600
(metres)

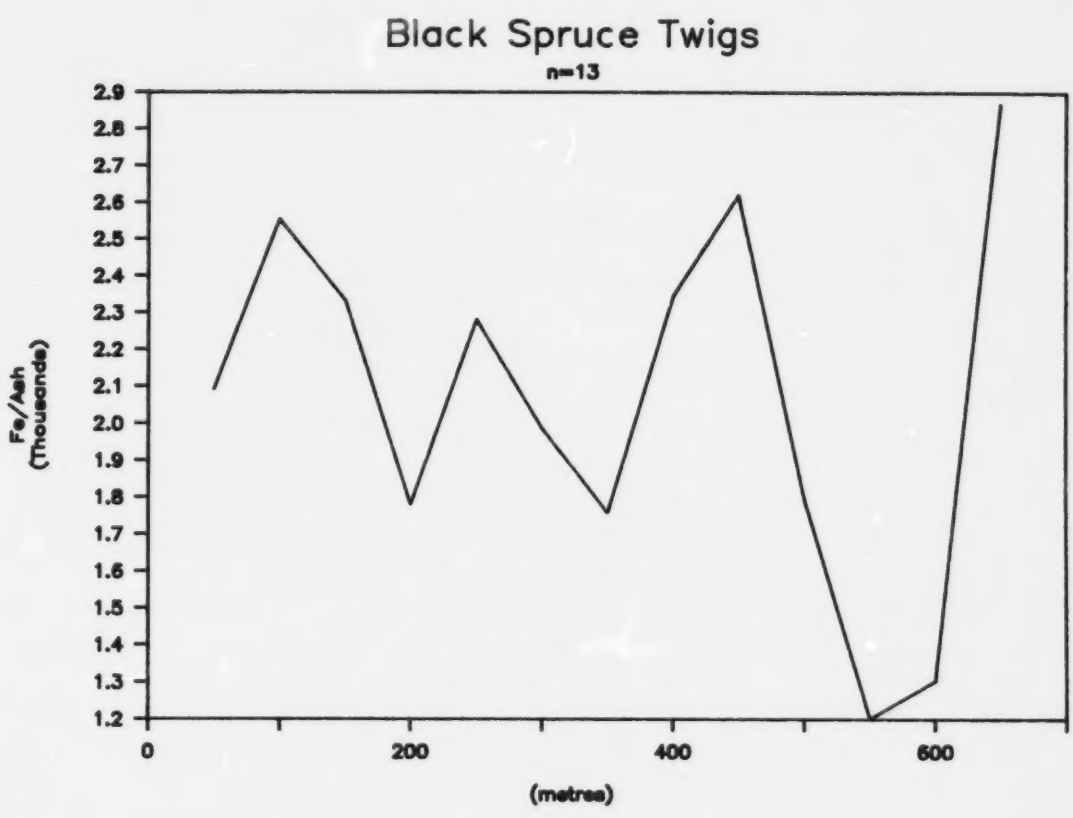
Black Spruce Twigs

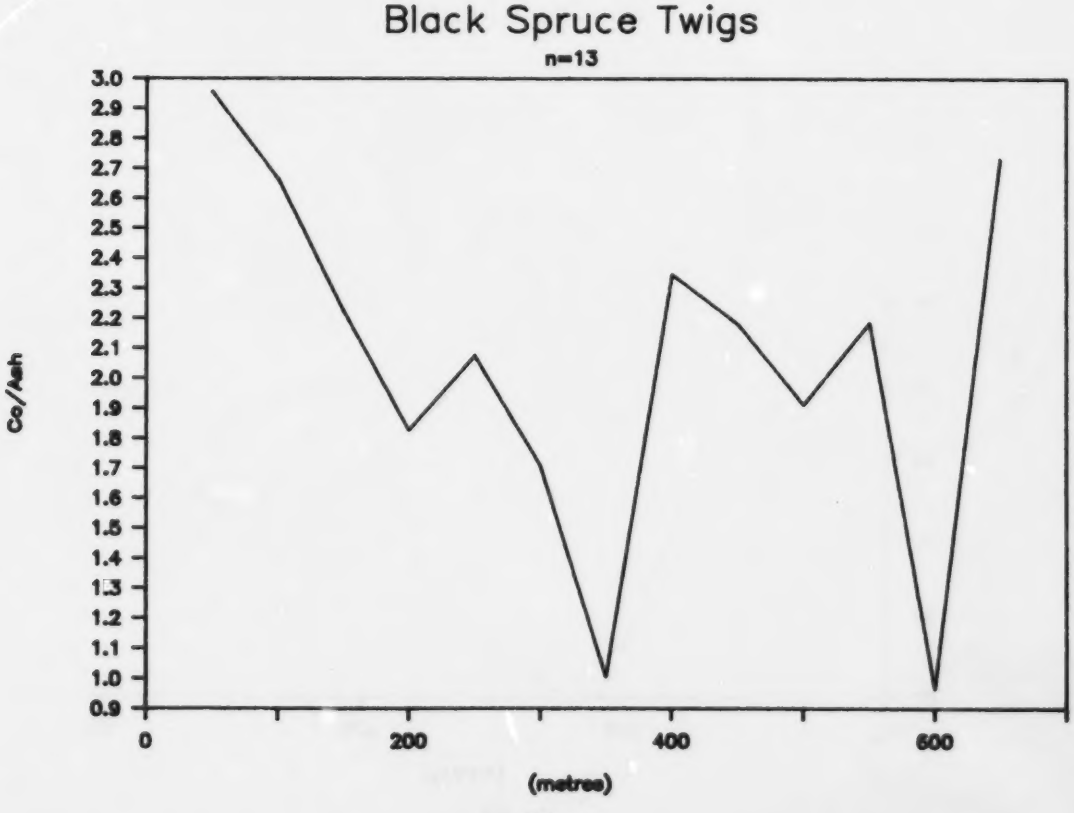
| Sample Number | Distance (m) | Cr (ppm) | Mn (ppm) | Fe (ppm) | Co (ppm) | Ni (ppm) | Cu (ppm) | Zn (ppm) | Pb (ppm) | Au (ash; ppb) | Au (dry sa; ppb) | As (dry sa; (ppm) | Ash (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T85-1 | 50 | 13 | 8200 | 4250 | 6 | 14 | 141 | 1645 | 50 | 1.8 | 0.9 | 0.1 | 2.03 |
| T85-2 | 100 | 16 | 7000 | 5750 | 6 | 17 | 134 | 2074 | 58 | 0.7 | 1.6 | 0.1 | 2.25 |
| T85-3 | 150 | 16 | 6100 | 5250 | 5 | 13 | 97 | 1556 | 63 | 0.9 | 0.6 | 0.1 | 2.25 |
| T85-4 | 200 | 11 | 4500 | 3900 | 4 | 5 | 73 | 1514 | 44 | 0.6 | 0.0 | 0.1 | 2.19 |
| T85-5 | 250 | 15 | 4500 | 5500 | 5 | 9 | 73 | 2055 | 52 | 0.8 | 0.7 | 0.1 | 2.41 |
| T85-6 | 300 | 13 | 6000 | 4650 | 4 | 7 | 76 | 1723 | 48 | 1.0 | 0.9 | 0.1 | 2.34 |
| T85-7 | 350 | 7 | 6500 | 3500 | 2 | 5 | 73 | 1625 | 29 | 0.4 | 0.2 | 0.1 | 1.99 |
| T85-8 | 400 | 13 | 8200 | 5000 | 5 | 7 | 105 | 2134 | 61 | 0.7 | 0.0 | 0.1 | 2.13 |
| T85-9 | 450 | 15 | 6800 | 6000 | 5 | 10 | 79 | 1965 | 61 | 0.8 | 0.0 | 0.1 | 2.29 |
| T85-10 | 500 | 10 | 7000 | 3750 | 4 | 6 | 87 | 1879 | 38 | 0.9 | 0.5 | 0.0 | 2.09 |
| T85-11 | 550 | 8 | 7100 | 2200 | 4 | 4 | 80 | 1515 | 28 | 0.3 | 0.0 | 0.0 | 1.83 |
| T85-12 | 600 | 8 | 6500 | 2700 | 2 | 4 | 83 | 1560 | 31 | 1.0 | 0.3 | 0.0 | 2.07 |
| T85-13 | 650 | 14 | 6000 | 5250 | 5 | 9 | 99 | 1905 | 58 | 1.5 | 1.0 | 0.1 | 1.83 |

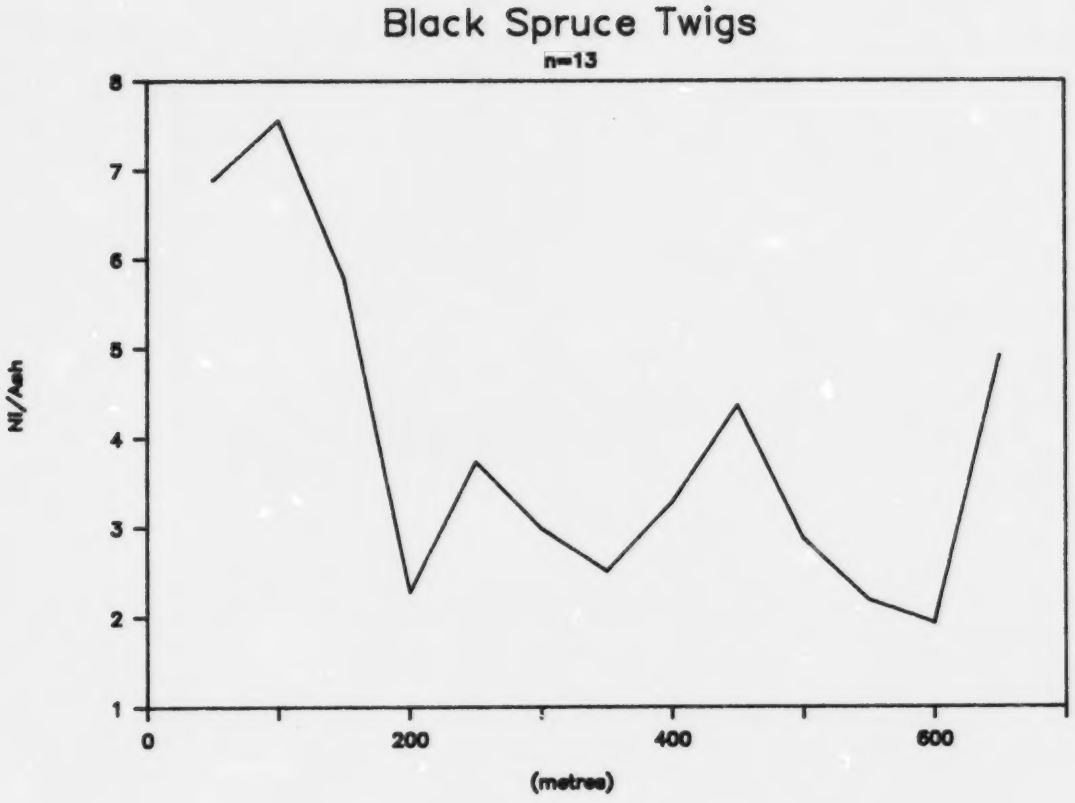
| Sample Number | Distance (m) | Cr/Ash | Mn/Ash | Fe/Ash | Co/Ash | Ni/Ash | Cu/Ash | Zn/Ash | Pb/Ash |
|---|---|---|---|---|---|---|---|---|---|
| T85-1 | 50 | 6.40 | 4039.41 | 2093.60 | 2.96 | 6.90 | 69.46 | 810.34 | 24.63 |
| T85-2 | 100 | 7.11 | 3111.11 | 2555.56 | 2.67 | 7.56 | 59.56 | 921.78 | 25.78 |
| T85-3 | 150 | 7.11 | 2711.11 | 2333.33 | 2.22 | 5.78 | 43.11 | 691.56 | 28.00 |
| T85-4 | 200 | 5.02 | 2054.79 | 1780.82 | 1.83 | 2.28 | 33.33 | 691.32 | 20.09 |
| T85-5 | 250 | 6.22 | 1867.22 | 2282.16 | 2.07 | 3.73 | 30.29 | 852.70 | 21.58 |
| T85-6 | 300 | 5.56 | 2564.10 | 1987.18 | 1.71 | 2.99 | 32.48 | 736.32 | 20.51 |
| T85-7 | 350 | 3.52 | 3266.33 | 1758.79 | 1.01 | 2.51 | 36.68 | 816.58 | 14.57 |
| T85-8 | 400 | 6.10 | 3849.77 | 2347.42 | 2.35 | 3.29 | 49.30 | 1001.88 | 28.64 |
| T85-9 | 450 | 6.55 | 2969.43 | 2620.09 | 2.18 | 4.37 | 34.50 | 858.08 | 26.64 |
| T85-10 | 500 | 4.78 | 3349.28 | 1794.26 | 1.91 | 2.87 | 41.63 | 899.04 | 18.18 |
| T85-11 | 550 | 4.37 | 3879.78 | 1202.19 | 2.19 | 2.19 | 43.72 | 827.87 | 15.30 |
| T85-12 | 600 | 3.86 | 3140.10 | 1304.35 | 0.97 | 1.93 | 40.10 | 753.62 | 14.98 |
| T85-13 | 650 | 7.65 | 3278.69 | 2868.85 | 2.73 | 4.92 | 54.10 | 1040.98 | 31.69 |

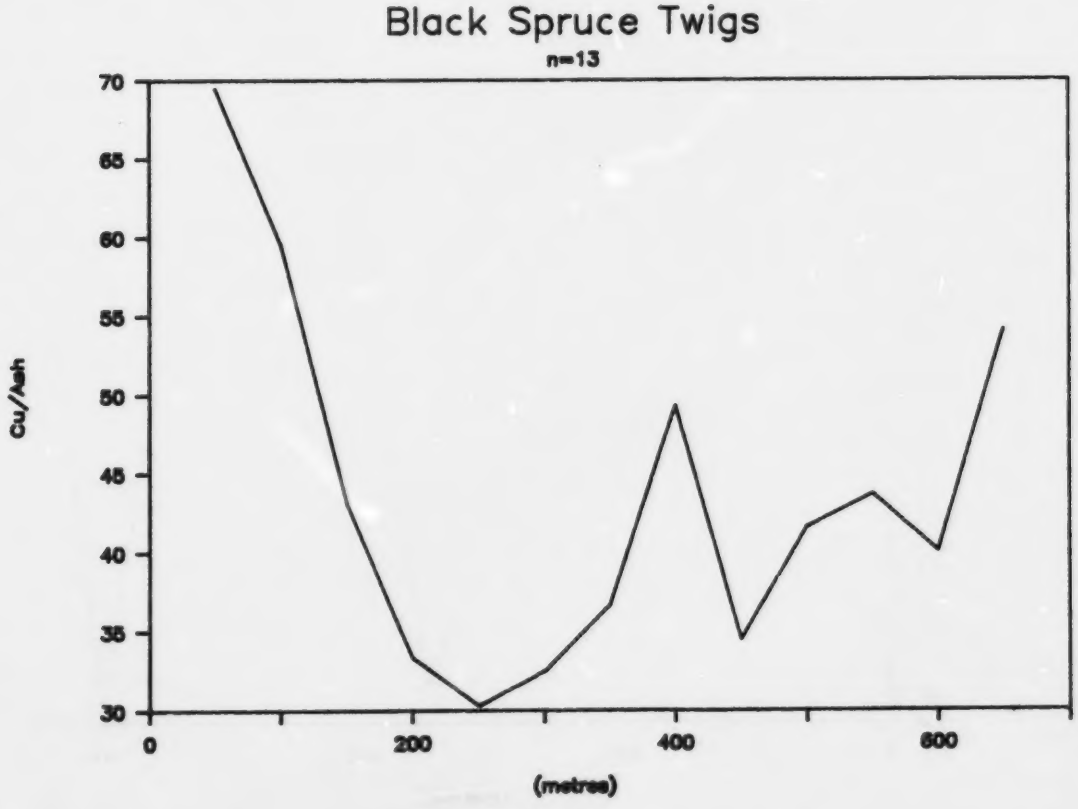
| Sample Number | Distance (m) | Cr/Mn | Fe/Mn | Co/Mn | Ni/Mn | Cu/Mn | Zn/Mn | Pb/Mn |
|---|---|---|---|---|---|---|---|---|
| T85-1 | 50 | 0.00159 | 0.5183 | 0.0007 | 0.00171 | 0.01720 | 0.20061 | 0.00610 |
| T85-2 | 100 | 0.00229 | 0.8214 | 0.0009 | 0.00243 | 0.01914 | 0.29629 | 0.00829 |
| T85-3 | 150 | 0.00262 | 0.8607 | 0.0008 | 0.00213 | 0.01590 | 0.25508 | 0.01033 |
| T85-4 | 200 | 0.00244 | 0.8667 | 0.0009 | 0.00111 | 0.01622 | 0.33644 | 0.00978 |
| T85-5 | 250 | 0.00333 | 1.2222 | 0.0011 | 0.00200 | 0.01622 | 0.45667 | 0.01156 |
| T85-6 | 300 | 0.00217 | 0.7750 | 0.0007 | 0.00117 | 0.01267 | 0.28717 | 0.00800 |
| T85-7 | 350 | 0.00108 | 0.5385 | 0.0003 | 0.00077 | 0.01123 | 0.25000 | 0.00446 |
| T85-8 | 400 | 0.00159 | 0.6098 | 0.0006 | 0.00085 | 0.01280 | 0.26024 | 0.00744 |
| T85-9 | 450 | 0.00221 | 0.8824 | 0.0007 | 0.00147 | 0.01162 | 0.28897 | 0.00897 |
| T85-10 | 500 | 0.00143 | 0.5357 | 0.0006 | 0.00086 | 0.01243 | 0.26843 | 0.00543 |
| T85-11 | 550 | 0.00113 | 0.3099 | 0.0006 | 0.00056 | 0.01127 | 0.21338 | 0.00394 |
| T85-12 | 600 | 0.00123 | 0.4154 | 0.0003 | 0.00062 | 0.01277 | 0.24000 | 0.00477 |
| T85-13 | 650 | 0.00233 | 0.8750 | 0.0008 | 0.00150 | 0.01650 | 0.31750 | 0.00967 |

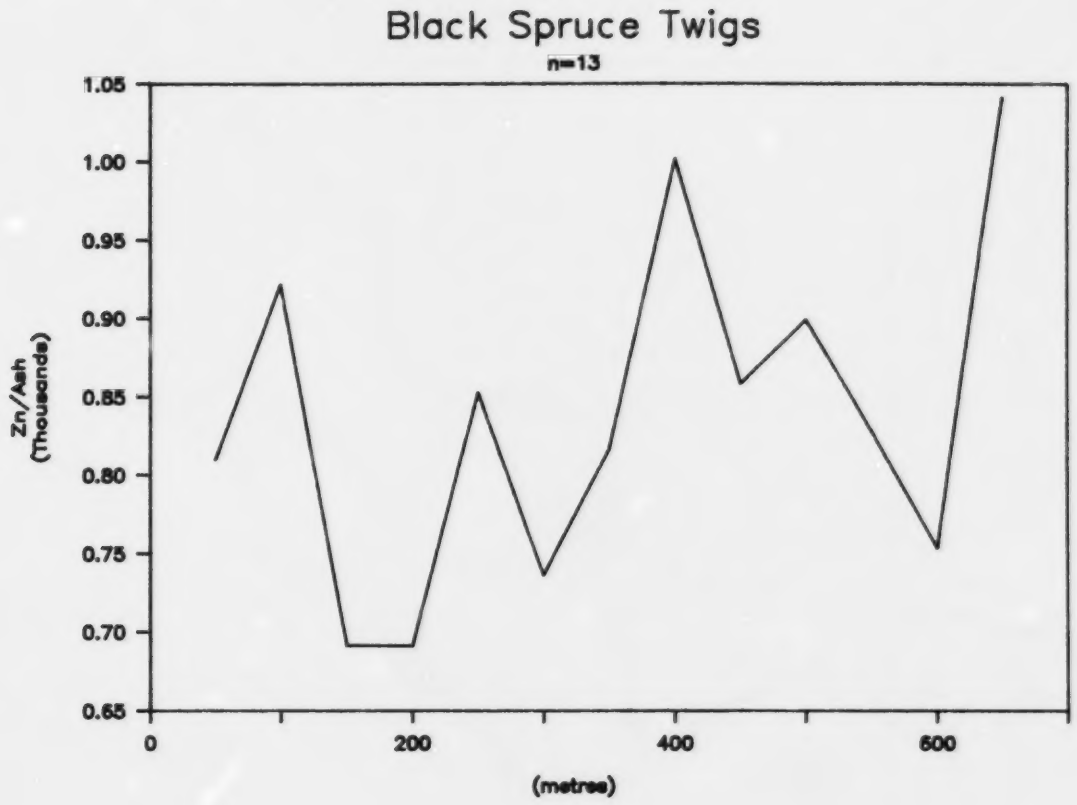
| Sample Number | Distance (m) | (Cr/Ash) /Mn | (Fe/Ash) /Mn | (Co/Ash) /Mn | (Ni/Ash) /Mn | (Cu/Ash) /Mn | (Zn/Ash) /Mn | (Pb/Ash) /Mn |
|---|---|---|---|---|---|---|---|---|
| T85-1 | 50 | 0.00078 | 0.25532 | 0.00036 | 0.00084 | 0.00847 | 0.09882 | 0.00300 |
| T85-2 | 100 | 0.00102 | 0.36508 | 0.00038 | 0.00108 | 0.00851 | 0.13168 | 0.00368 |
| T85-3 | 150 | 0.00117 | 0.38251 | 0.00036 | 0.00095 | 0.00707 | 0.11337 | 0.00459 |
| T85-4 | 200 | 0.00112 | 0.39574 | 0.00041 | 0.00051 | 0.00741 | 0.15363 | 0.00446 |
| T85-5 | 250 | 0.00138 | 0.50715 | 0.00046 | 0.00083 | 0.00673 | 0.18949 | 0.00479 |
| T85-6 | 300 | 0.00093 | 0.33120 | 0.00028 | 0.00050 | 0.00541 | 0.12272 | 0.00342 |
| T85-7 | 350 | 0.00054 | 0.27058 | 0.00015 | 0.00039 | 0.00564 | 0.12563 | 0.00224 |
| T85-8 | 400 | 0.00074 | 0.28627 | 0.00029 | 0.00040 | 0.00601 | 0.12218 | 0.00349 |
| T85-9 | 450 | 0.00096 | 0.38531 | 0.00032 | 0.00064 | 0.00507 | 0.12619 | 0.00392 |
| T85-10 | 500 | 0.00068 | 0.25632 | 0.00027 | 0.00041 | 0.00595 | 0.12843 | 0.00260 |
| T85-11 | 550 | 0.00062 | 0.16932 | 0.00031 | 0.00031 | 0.00616 | 0.11660 | 0.00216 |
| T85-12 | 600 | 0.00059 | 0.20067 | 0.00015 | 0.00030 | 0.00617 | 0.11594 | 0.00230 |
| T85-13 | 650 | 0.00128 | 0.47814 | 0.00046 | 0.00082 | 0.00902 | 0.17350 | 0.00528 |

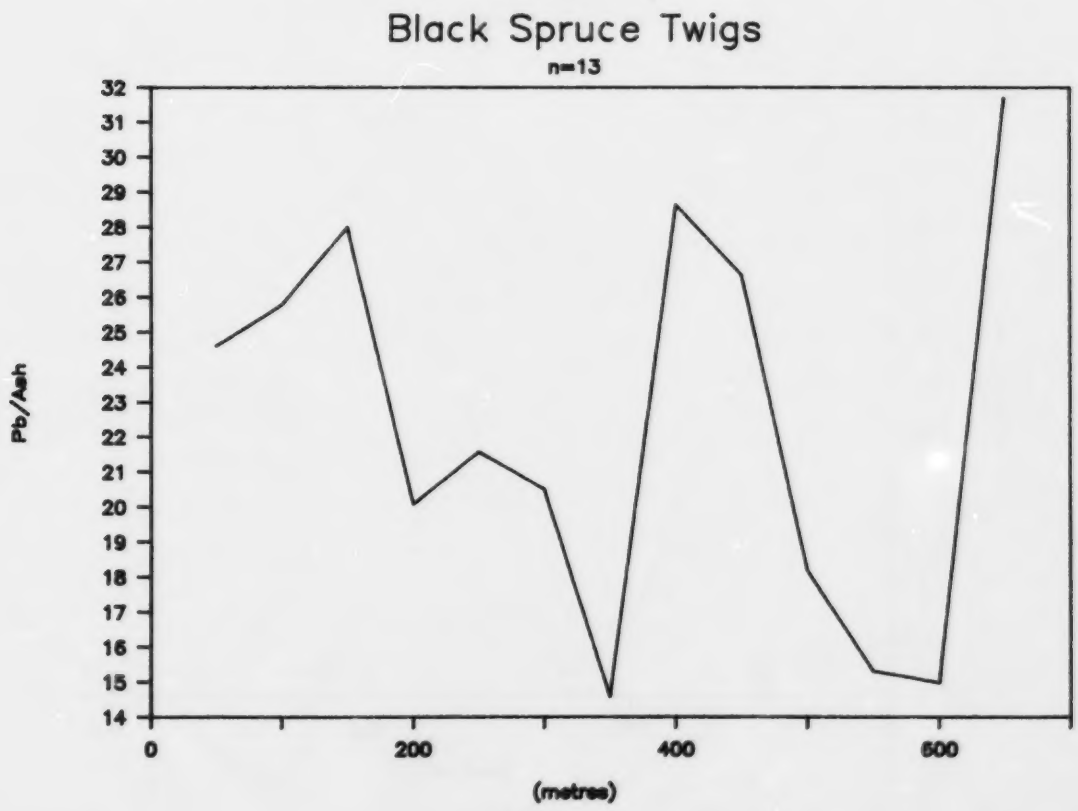

Black Spruce Twigs
n=13
Fe/Ash
(Thousands)
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
0
200
400
600
(metres)

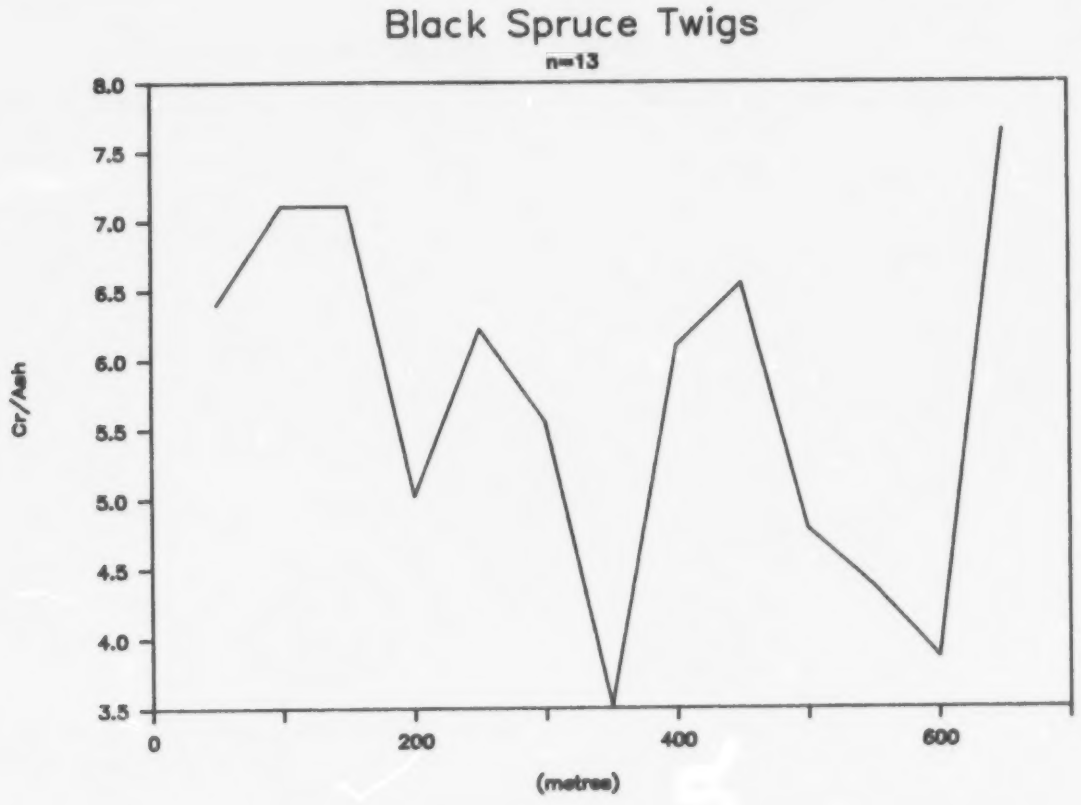

Black Spruce Twigs
n=13
Co/Ash
3.0
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0
200
400
600
(metres)

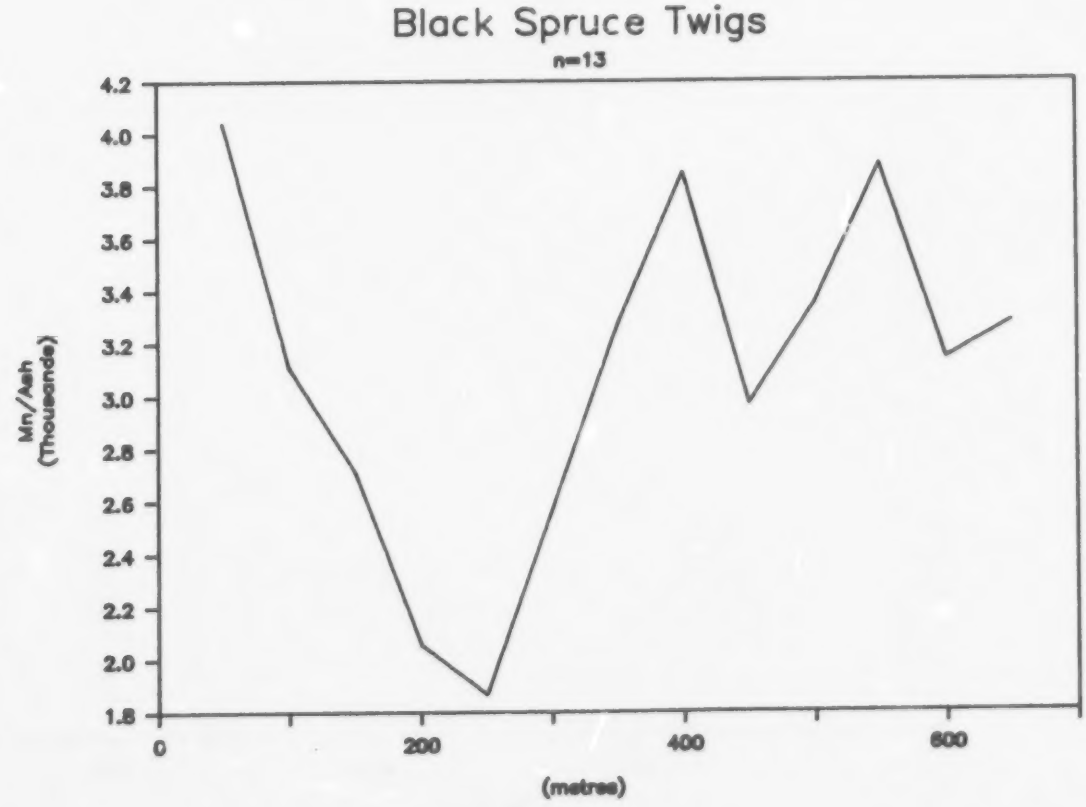

Black Spruce Twigs
n=13
Ni/Ash
8
7
6
5
4
3
2
1
0
200
400
600
(metres)

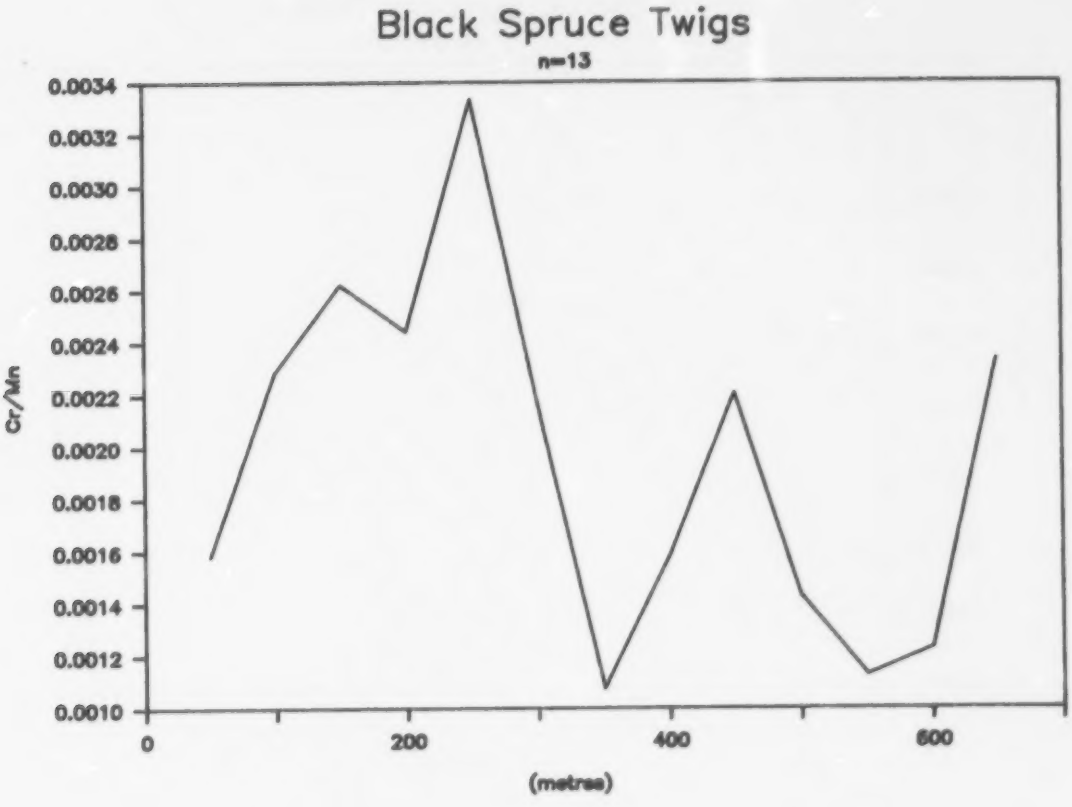

Black Spruce Twigs
n=13
Cu/Ash
70
65
60
55
50
45
40
35
30
0
200
400
600
(metres)

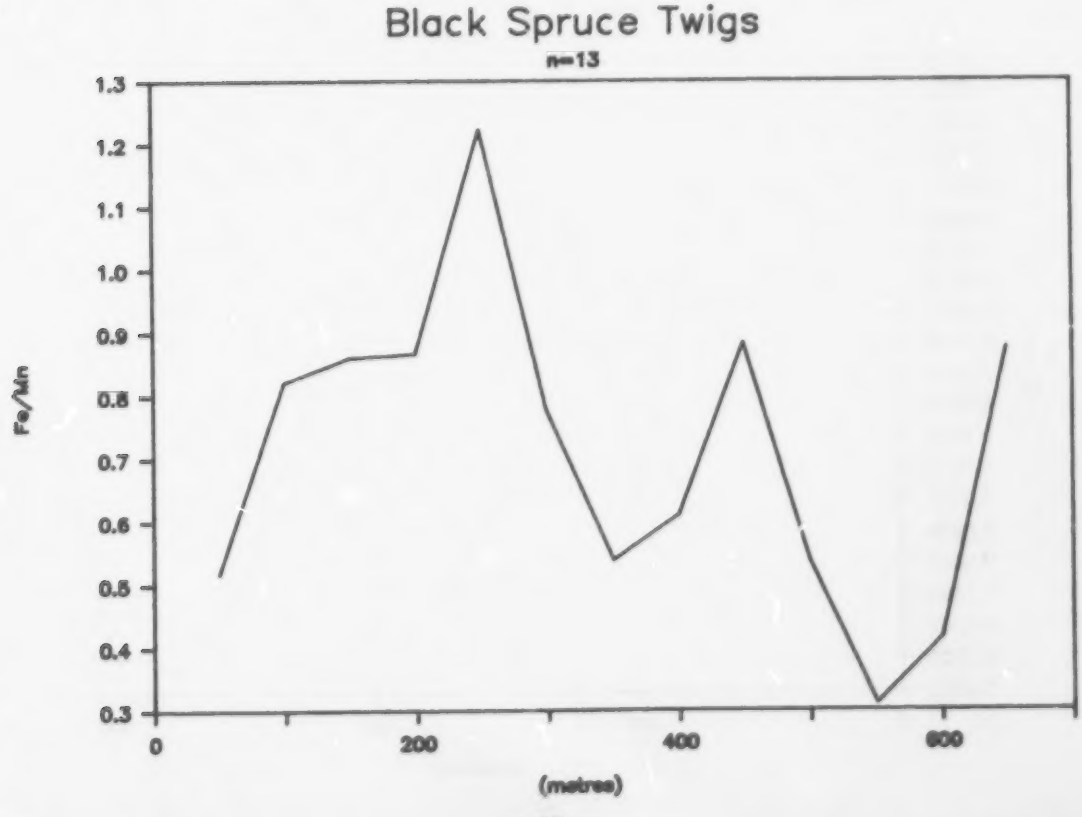

Black Spruce Twigs
n=13
Zn/Ash
(Thousands)
1.05
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0
200
400
600
(metres)

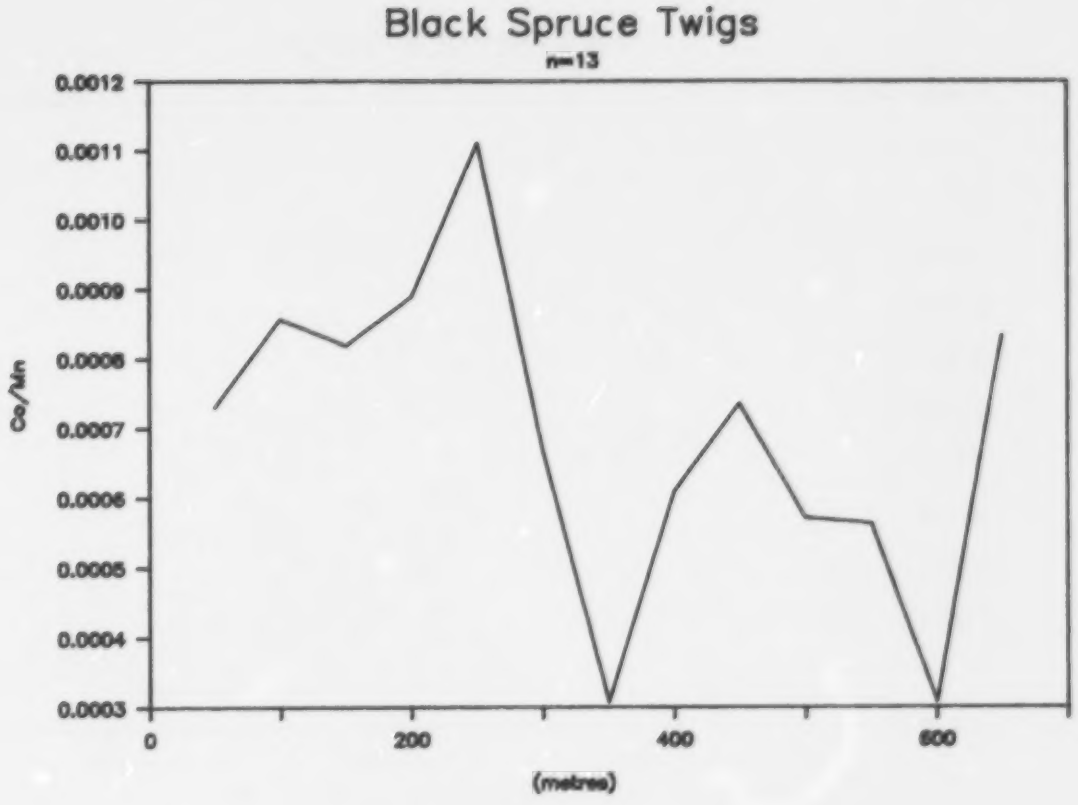

Black Spruce Twigs
n=13
Pb/Ash
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
0
200
400
600
(metres)

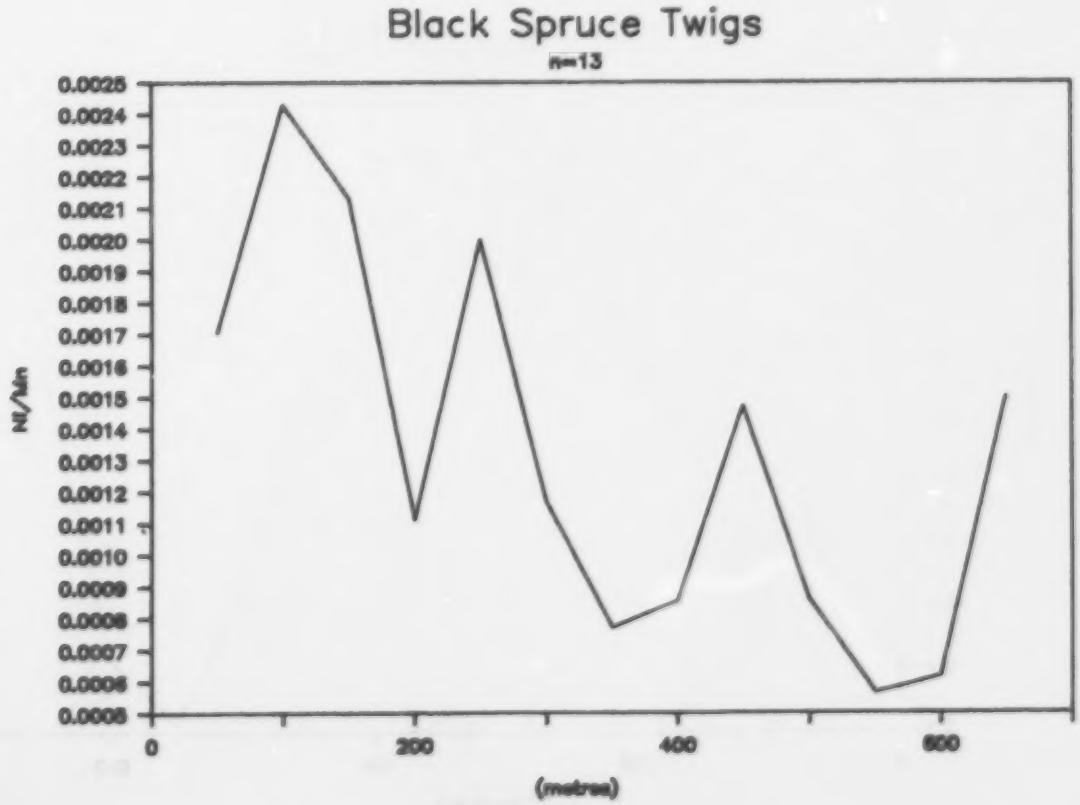

Black Spruce Twigs
n=13
Cr/Ash
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
0
200
400
600
(metres)

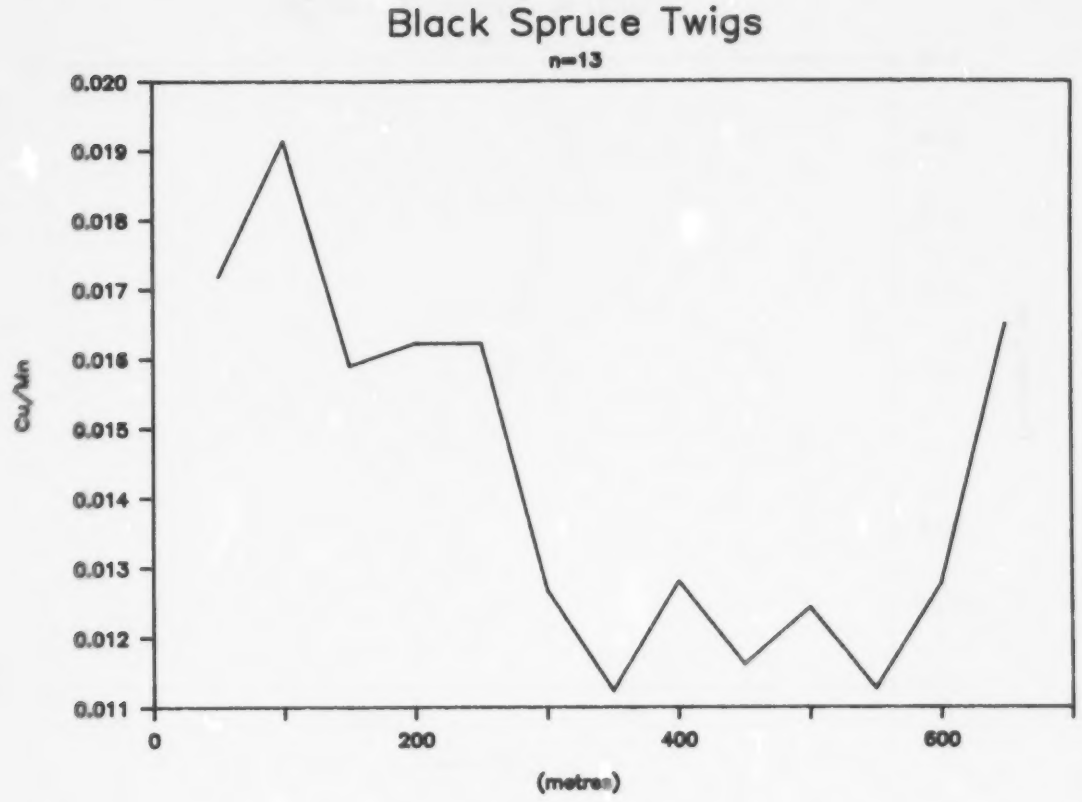

Black Spruce Twigs
n=13
Mn/Ash
(Thousands)
4.2
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
0
200
400
600
(metres)

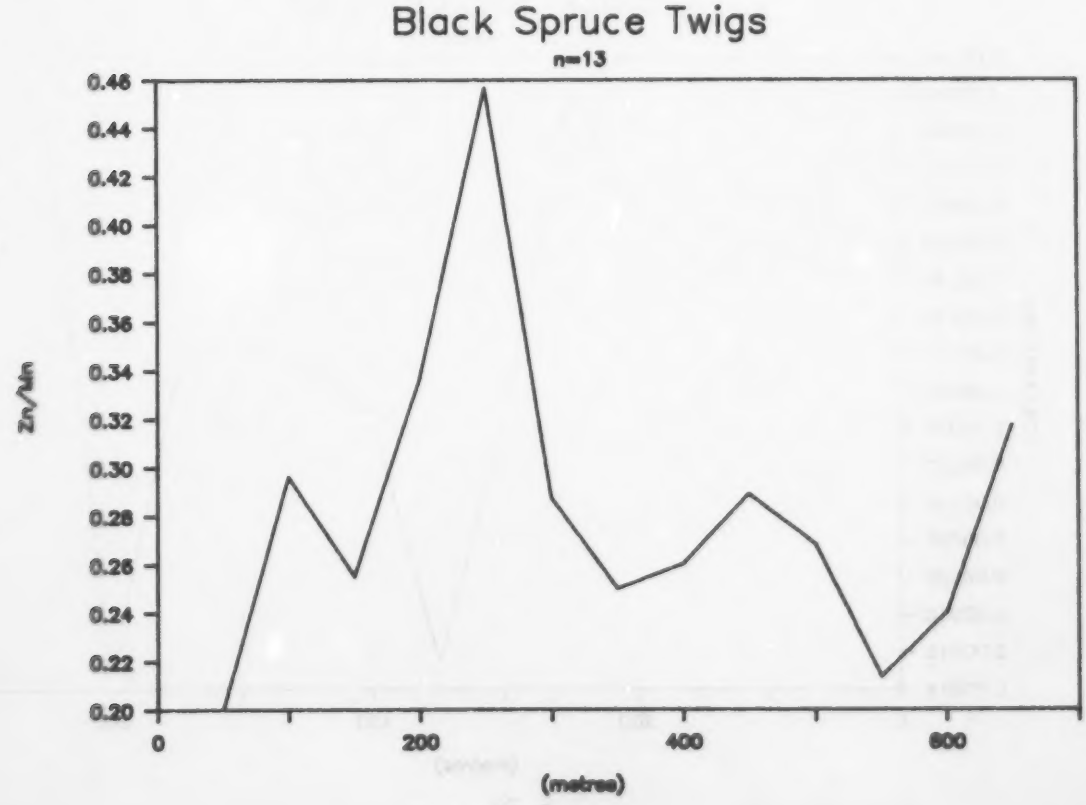

Black Spruce Twigs
n=13
Cr/Mn
0.0034
0.0032
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
0
200
400
600
(metres)

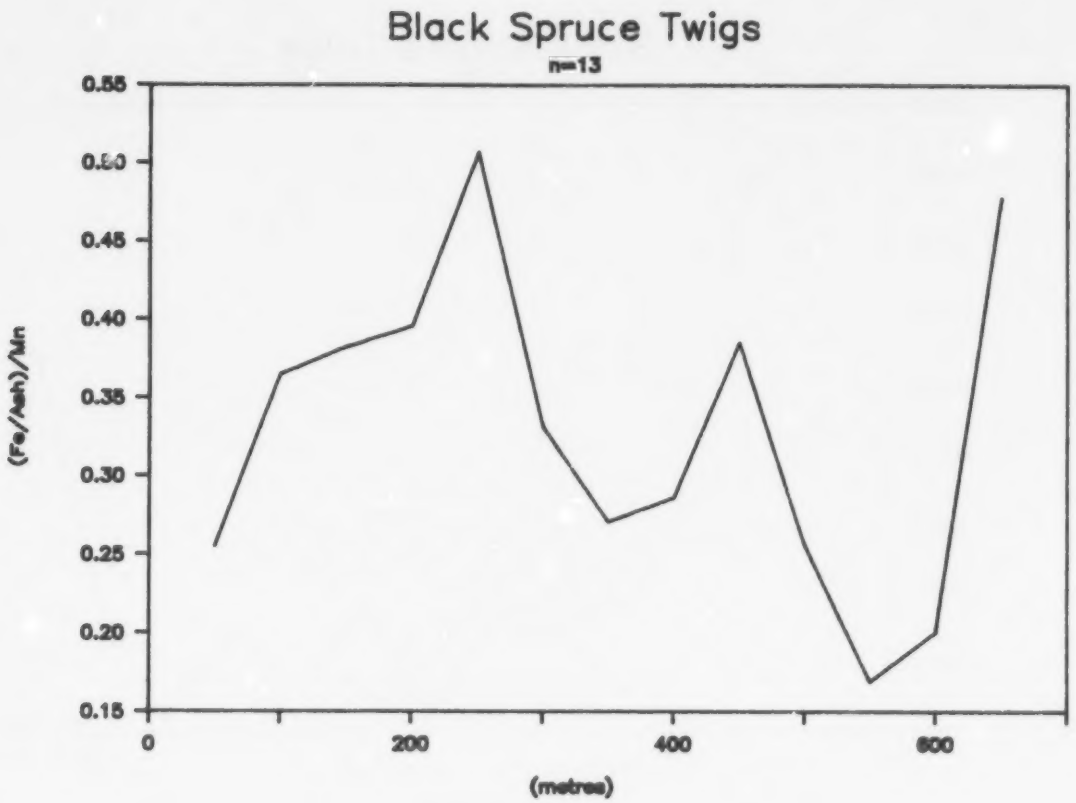

Black Spruce Twigs
n=13
Fe/Mn
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0
200
400
600
(metres)

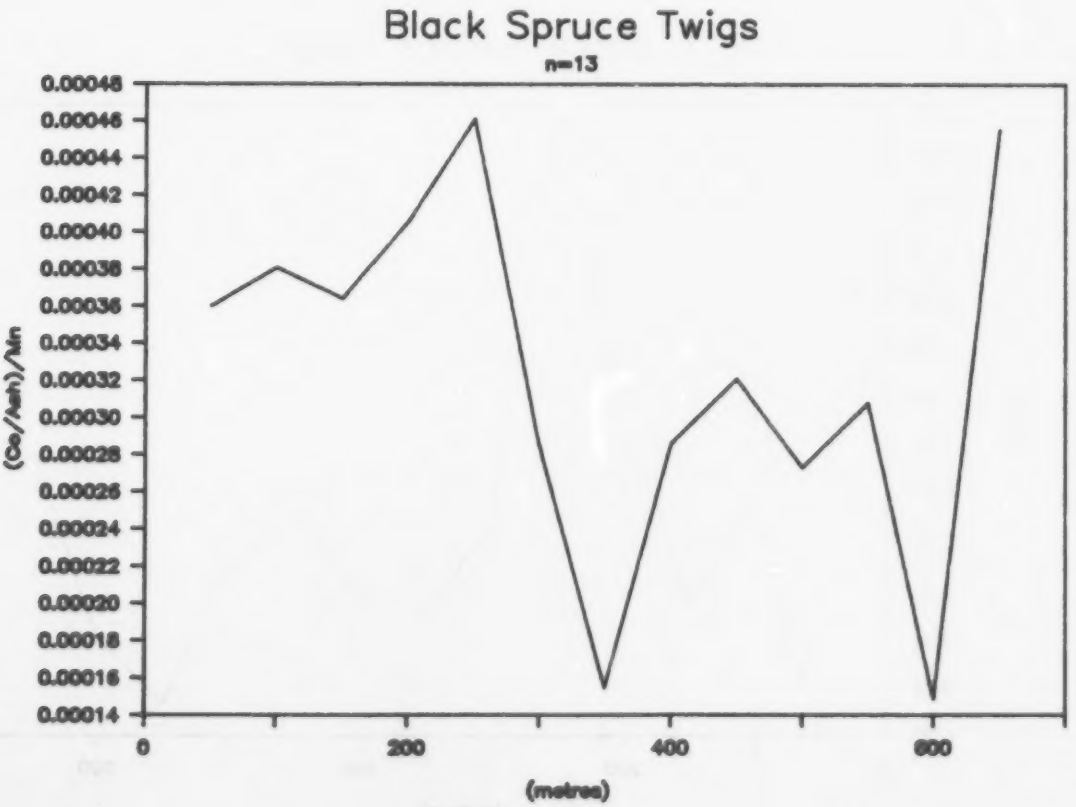

Black Spruce Twigs
n=13
0.0012
0.0011
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
Co/Mn
0
200
400
600
(metres)

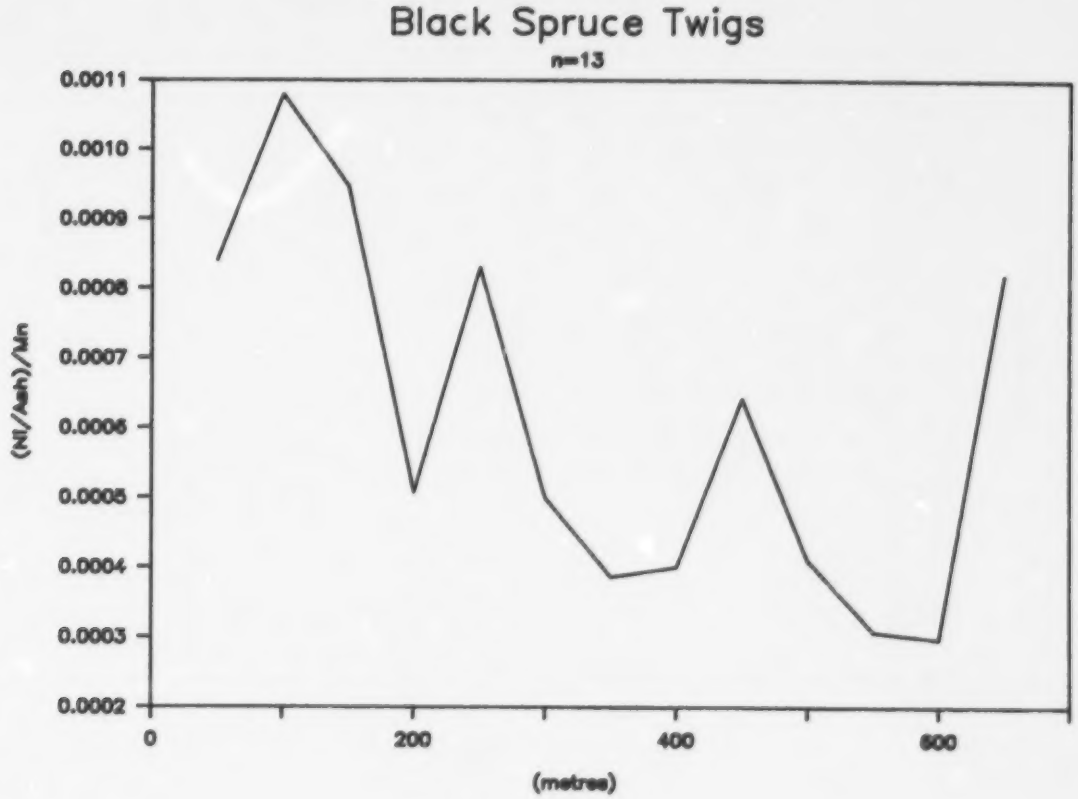

Black Spruce Twigs
n=13
0.0025
0.0024
0.0023
0.0022
0.0021
0.0020
0.0019
0.0018
0.0017
0.0016
0.0015
0.0014
0.0013
0.0012
0.0011
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
Ni/Mn
0
200
400
600
(metres)

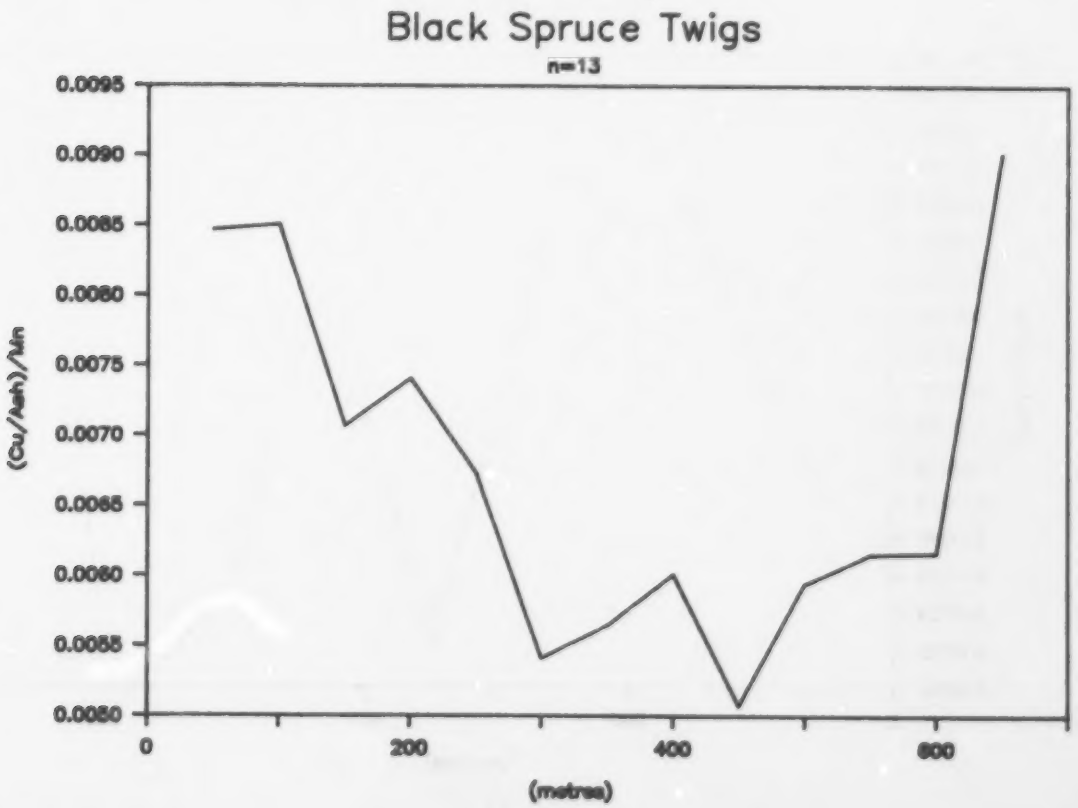

Black Spruce Twigs
n=13
0.020
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
Cu/kln
0
200
400
600
(metres)

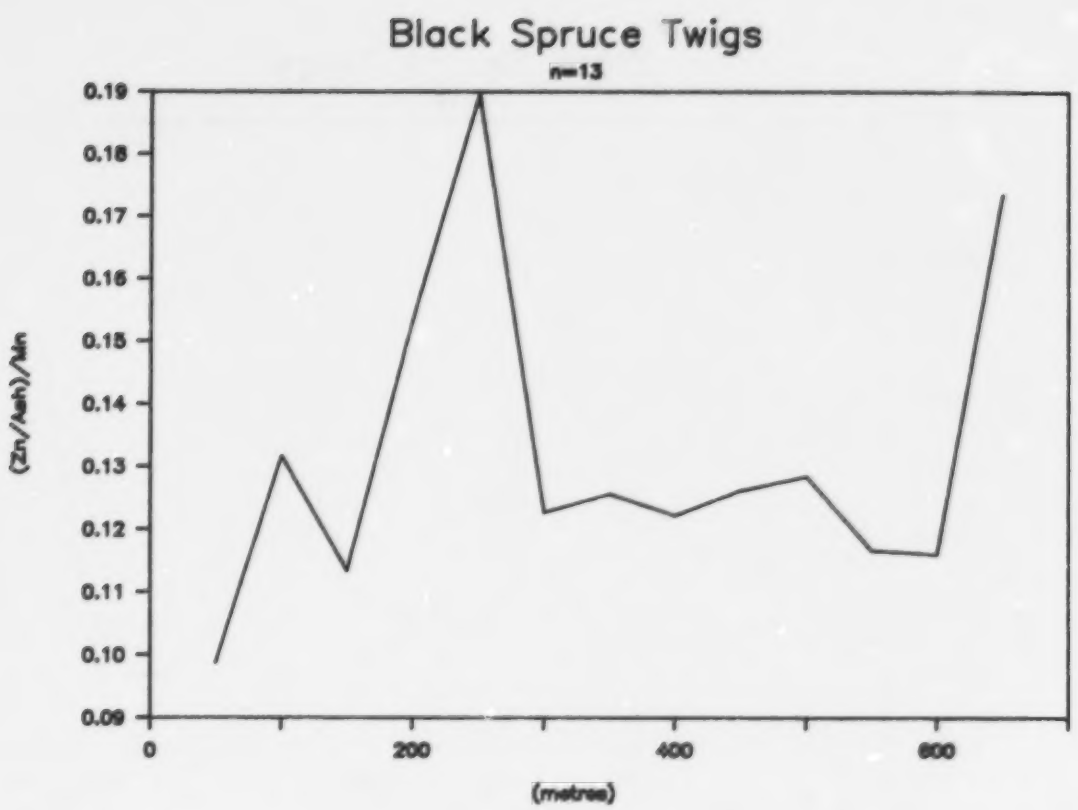

Black Spruce Twigs
n=13
0.46
0.44
0.42
0.40
0.38
0.36
0.34
0.32
0.30
0.28
0.26
0.24
0.22
0.20
Zn/kln
0
200
400
600
(metres)

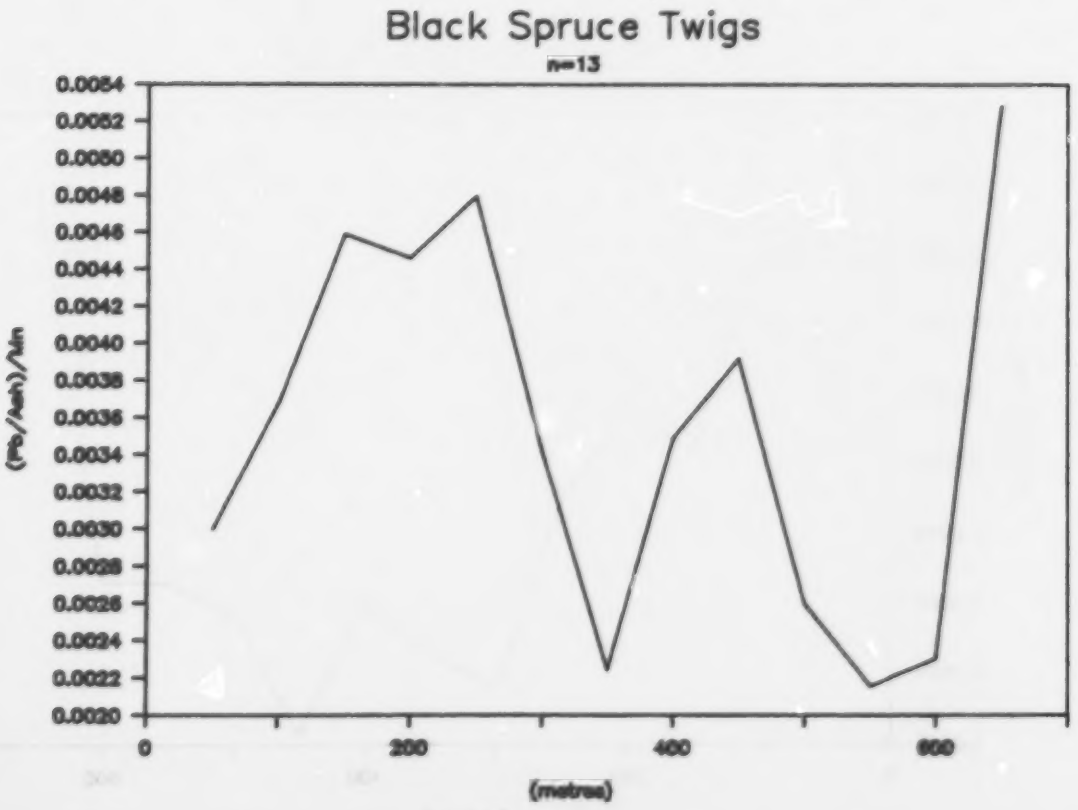

Black Spruce Twigs
n=13
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
(Fe/Ash)/Mn
0
200
400
600
(metres)

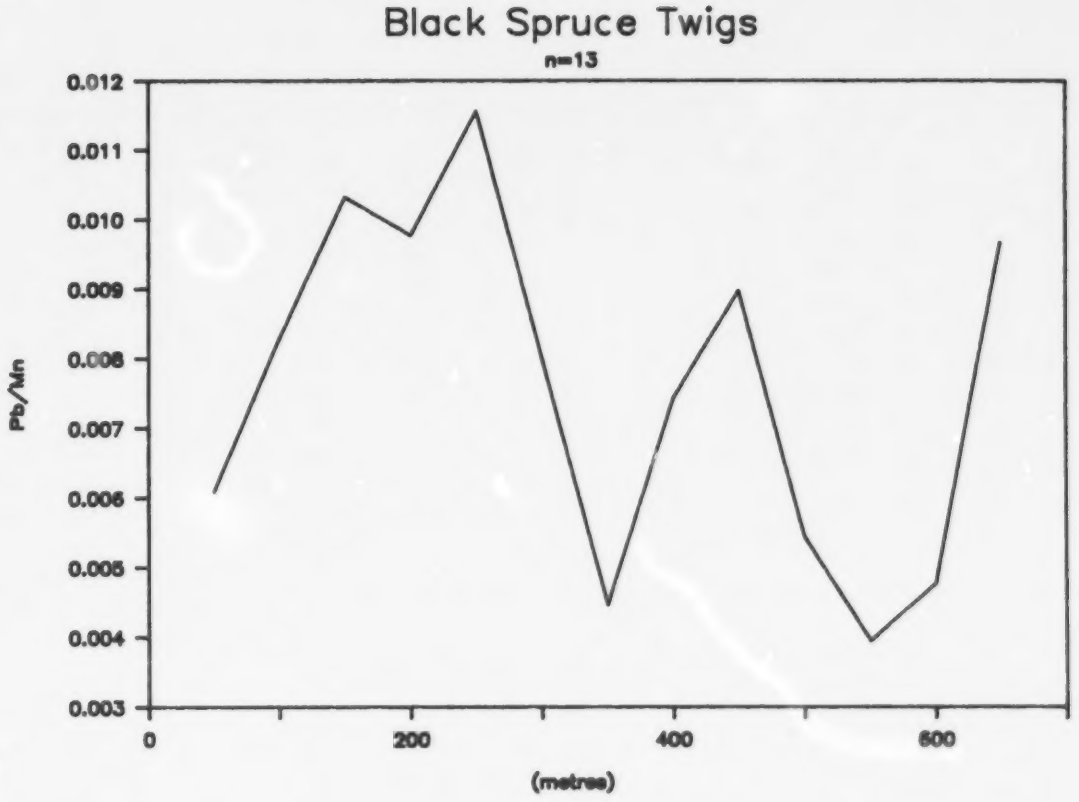

Black Spruce Twigs
n=13
0.00048
0.00046
0.00044
0.00042
0.00040
0.00038
0.00036
0.00034
0.00032
0.00030
0.00028
0.00026
0.00024
0.00022
0.00020
0.00018
0.00016
0.00014
(Co/Ash)/Mn
0
200
400
600
(metres)

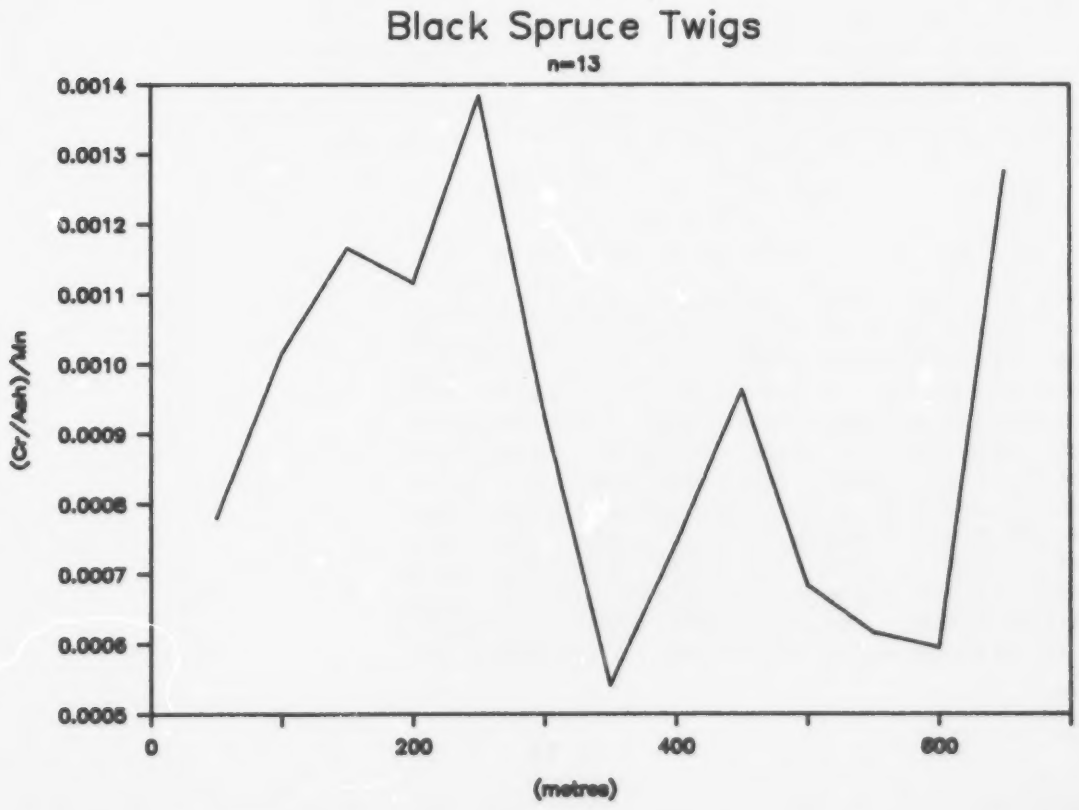

Black Spruce Twigs
n=13
0.0011
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
(Ni/Ash)/Nin
0
200
400
600
(metres)


Black Spruce Twigs
n=13
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
(Cu/Ash)/Nin
0
200
400
600
(metres)


Black Spruce Twigs
n=13
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
(Zn/Ash)/Nin
0
200
400
600
(metres)


Black Spruce Twigs
n=13
0.0054
0.0052
0.0050
0.0048
0.0046
0.0044
0.0042
0.0040
0.0038
0.0036
0.0034
0.0032
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
(Pb/Ash)/Nin
0
200
400
600
(metres)


Black Spruce Twigs
n=13
0.012
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
Pb/Mn
0
200
400
600
(metres)


Black Spruce Twigs
n=13
0.0014
0.0013
0.0012
0.0011
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
(Cr/Ash)/Mn
0
200
400
600
(metres)

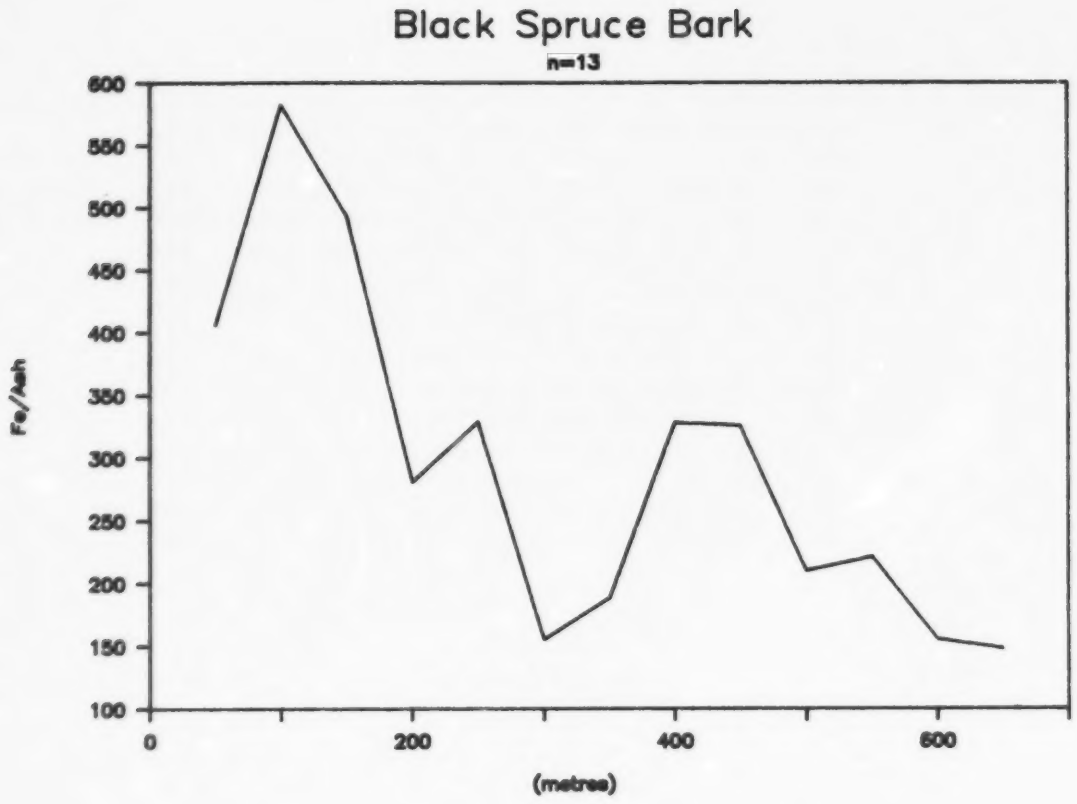
Black Spruce Bark

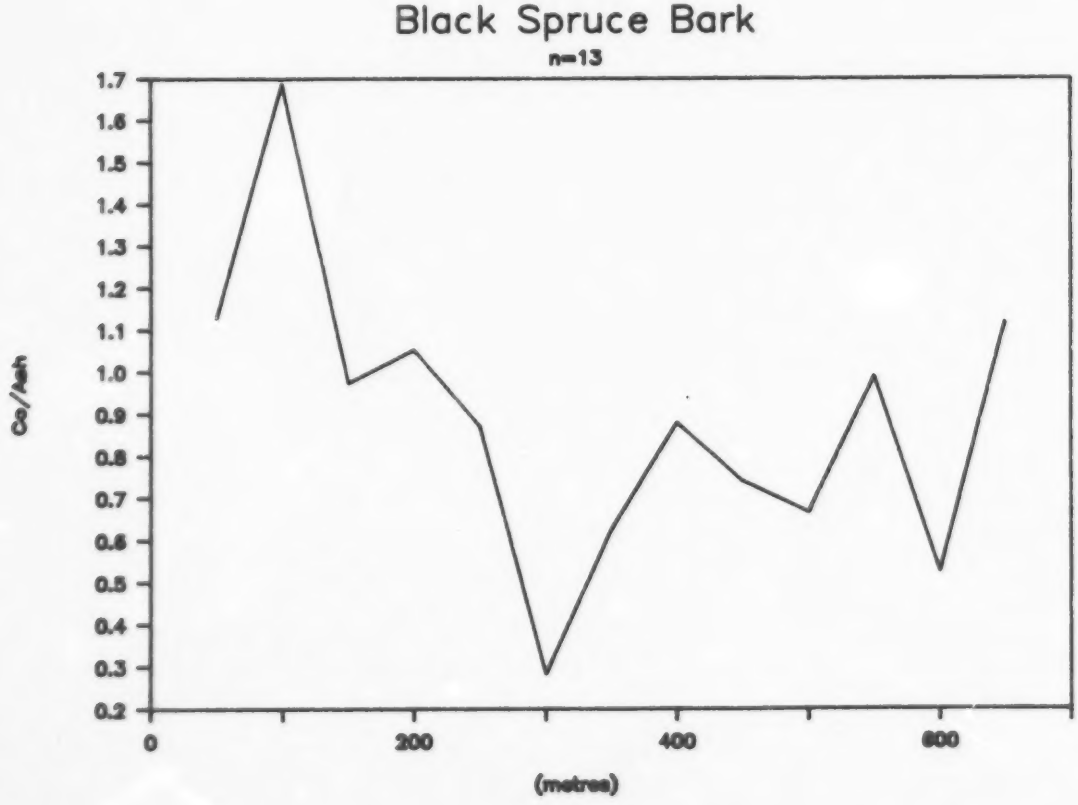
| Sample Number | Dist. (m) | Cr (ppm) | Mn (ppm) | Fe (ppm) | Co (ppm) | Ni (ppm) | Cu (ppm) | Zn (ppm) | Pb (ppm) | Au (ash; ppb) | Au (dry sa; ppb) | As (dry sa; (ppm) | Ash (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B851 | 50 | 20 | 8250 | 1440 | 4 | 11 | 51 | 2100 | 217 | 0.6 | 0.9 | 0.2 | 3.54 |
| B852 | 100 | 33 | 7800 | 1380 | 4 | 11 | 78 | 3280 | 167 | 0.9 | 1.1 | 0.1 | 2.37 |
| B853 | 150 | 26 | 7800 | 1520 | 3 | 6 | 55 | 2250 | 80 | 0.9 | 0.5 | 0.1 | 3.08 |
| B854 | 200 | 20 | 5200 | 800 | 3 | 5 | 47 | 2480 | 61 | 0.6 | 0.5 | 0.1 | 2.85 |
| B855 | 250 | 14 | 3500 | 1130 | 3 | 5 | 37 | 2240 | 38 | 0.6 | 0.3 | 0.1 | 3.44 |
| B856 | 300 | 12 | 7000 | 550 | 1 | 4 | 33 | 2600 | 25 | 0.6 | 0.2 | 0.1 | 3.54 |
| B857 | 350 | 12 | 8700 | 600 | 2 | 4 | 40 | 2760 | 41 | 0.6 | 0.5 | 0.1 | 3.19 |
| B858 | 400 | 14 | 10750 | 1120 | 3 | 4 | 49 | 3560 | 42 | 0.5 | 0.3 | 0.1 | 3.41 |
| B859 | 450 | 12 | 10000 | 880 | 2 | 5 | 53 | 3600 | 44 | 0.4 | 0.2 | 0.1 | 2.70 |
| B8510 | 500 | 12 | 10000 | 630 | 2 | 5 | 51 | 3920 | 39 | 0.5 | 0.4 | 0.0 | 3.00 |
| B8511 | 550 | 13 | 11250 | 670 | 3 | 4 | 44 | 3520 | 38 | 0.3 | 0.3 | 0.1 | 3.03 |
| B8512 | 600 | 10 | 7400 | 590 | 2 | 3 | 34 | 2440 | 24 | 0.3 | 0.5 | 0.1 | 3.80 |
| B8513 | 650 | 8 | 7400 | 530 | 4 | 3 | 40 | 2560 | 23 | 0.2 | 0.2 | 0.1 | 3.58 |

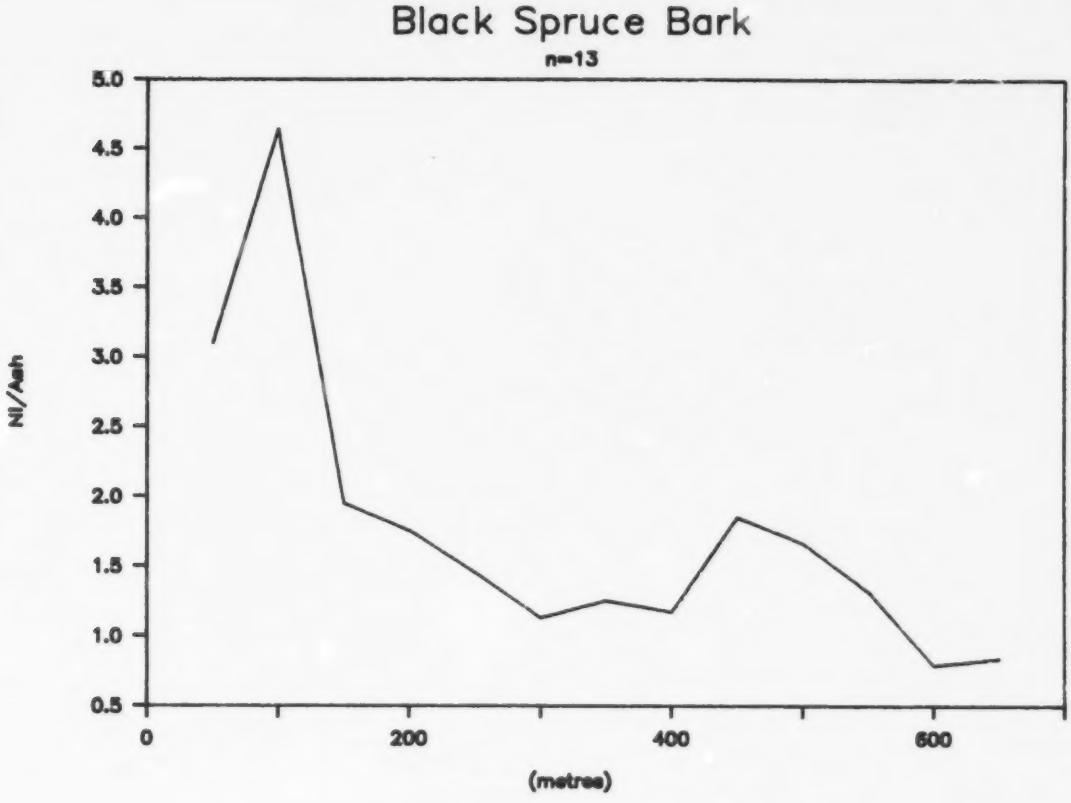
| Sample Number | Distan (m) | Cr/Ash | Mn/Ash | Fe/Ash | Co/Ash | Ni/Ash | Cu/Ash | Zn/Ash | Pb/Ash |
|---|---|---|---|---|---|---|---|---|---|
| B851 | 50 | 5.65 | 2330.51 | 406.78 | 1.13 | 3.11 | 14.41 | 593.22 | 61.30 |
| B852 | 100 | 13.92 | 3291.14 | 582.28 | 1.69 | 4.64 | 32.91 | 1383.97 | 70.46 |
| B853 | 150 | 8.44 | 2532.47 | 493.51 | 0.97 | 1.95 | 17.86 | 730.52 | 25.97 |
| B854 | 200 | 7.02 | 1824.56 | 280.70 | 1.05 | 1.75 | 16.49 | 870.18 | 21.40 |
| B855 | 250 | 4.07 | 1017.44 | 328.49 | 0.87 | 1.45 | 10.76 | 651.16 | 11.05 |
| B856 | 300 | 3.39 | 1977.40 | 155.37 | 0.28 | 1.13 | 9.32 | 734.46 | 7.06 |
| B857 | 350 | 3.76 | 2727.27 | 188.09 | 0.63 | 1.25 | 12.54 | 865.20 | 12.85 |
| B858 | 400 | 4.11 | 3152.49 | 328.45 | 0.88 | 1.17 | 14.37 | 1043.99 | 12.32 |
| B859 | 450 | 4.44 | 3703.70 | 325.93 | 0.74 | 1.85 | 19.63 | 1333.33 | 16.30 |
| B8510 | 500 | 4.00 | 3333.33 | 210.00 | 0.67 | 1.67 | 17.00 | 1306.67 | 13.00 |
| B8511 | 550 | 4.29 | 3712.87 | 221.12 | 0.99 | 1.32 | 14.52 | 1161.72 | 12.54 |
| B8512 | 600 | 2.63 | 1947.37 | 155.26 | 0.53 | 0.79 | 8.95 | 642.11 | 6.32 |
| B8513 | 650 | 2.23 | 2067.04 | 148.04 | 1.12 | 0.84 | 11.17 | 715.08 | 6.42 |

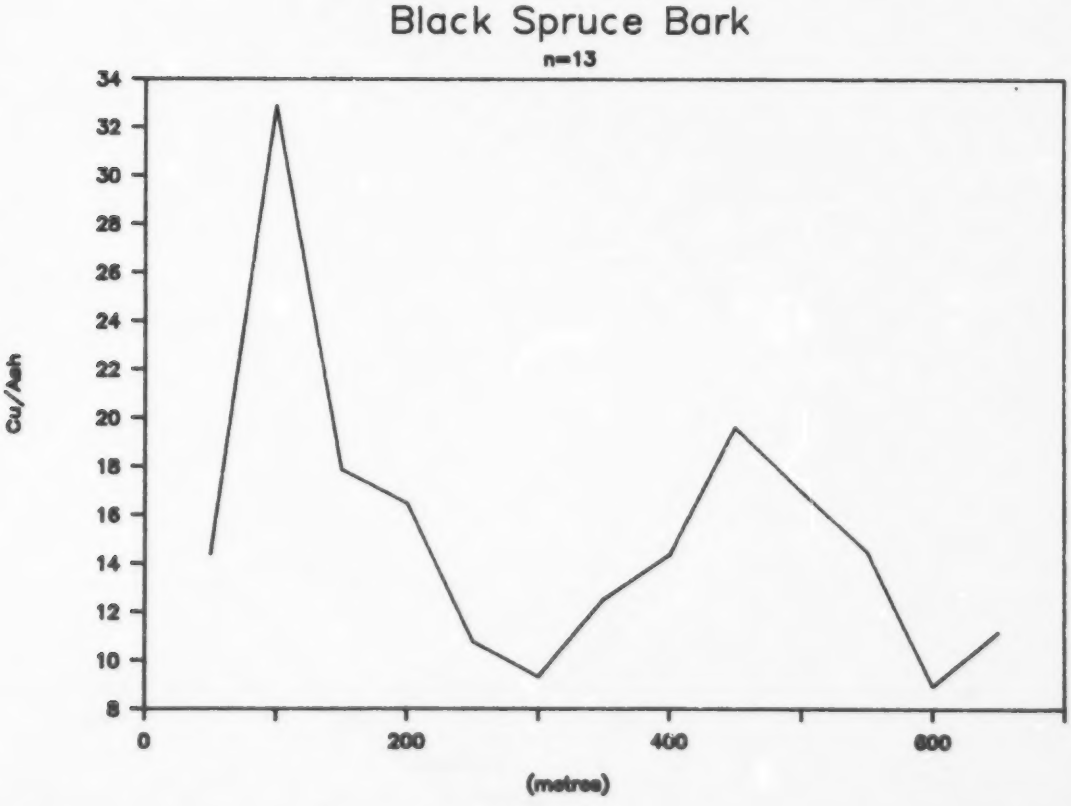
| Sample Number | Distan (m) | Cr/Mn | Fe/Mn | Co/Mn | Ni/Mn | Cu/Mn | Zn/Mn | Pb/Mn |
|---|---|---|---|---|---|---|---|---|
| B851 | 50 | 0.00242 | 0.1745 | 0.0005 | 0.00133 | 0.00618 | 0.25455 | 0.02630 |
| B852 | 100 | 0.00423 | 0.1769 | 0.0005 | 0.00141 | 0.01000 | 0.42051 | 0.02141 |
| B853 | 150 | 0.00333 | 0.1949 | 0.0004 | 0.00077 | 0.00705 | 0.28846 | 0.01026 |
| B854 | 200 | 0.00385 | 0.1538 | 0.0006 | 0.00096 | 0.00904 | 0.47692 | 0.01173 |
| B855 | 250 | 0.00400 | 0.3229 | 0.0009 | 0.00143 | 0.01057 | 0.64000 | 0.01086 |
| B856 | 300 | 0.00171 | 0.0786 | 0.0001 | 0.00057 | 0.00471 | 0.37143 | 0.00357 |
| B857 | 350 | 0.00138 | 0.0690 | 0.0002 | 0.00046 | 0.00460 | 0.31724 | 0.00471 |
| B858 | 400 | 0.00130 | 0.1042 | 0.0003 | 0.00037 | 0.00456 | 0.33116 | 0.00391 |
| B859 | 450 | 0.00120 | 0.0880 | 0.0002 | 0.00050 | 0.00530 | 0.36000 | 0.00440 |
| B8510 | 500 | 0.00120 | 0.0630 | 0.0002 | 0.00050 | 0.00510 | 0.39200 | 0.00390 |
| B8511 | 550 | 0.00116 | 0.0596 | 0.0003 | 0.00036 | 0.00391 | 0.31289 | 0.00338 |
| B8512 | 600 | 0.00135 | 0.0797 | 0.0003 | 0.00041 | 0.00459 | 0.32973 | 0.00324 |
| B8513 | 650 | 0.00108 | 0.0716 | 0.0005 | 0.00041 | 0.00541 | 0.34595 | 0.00311 |

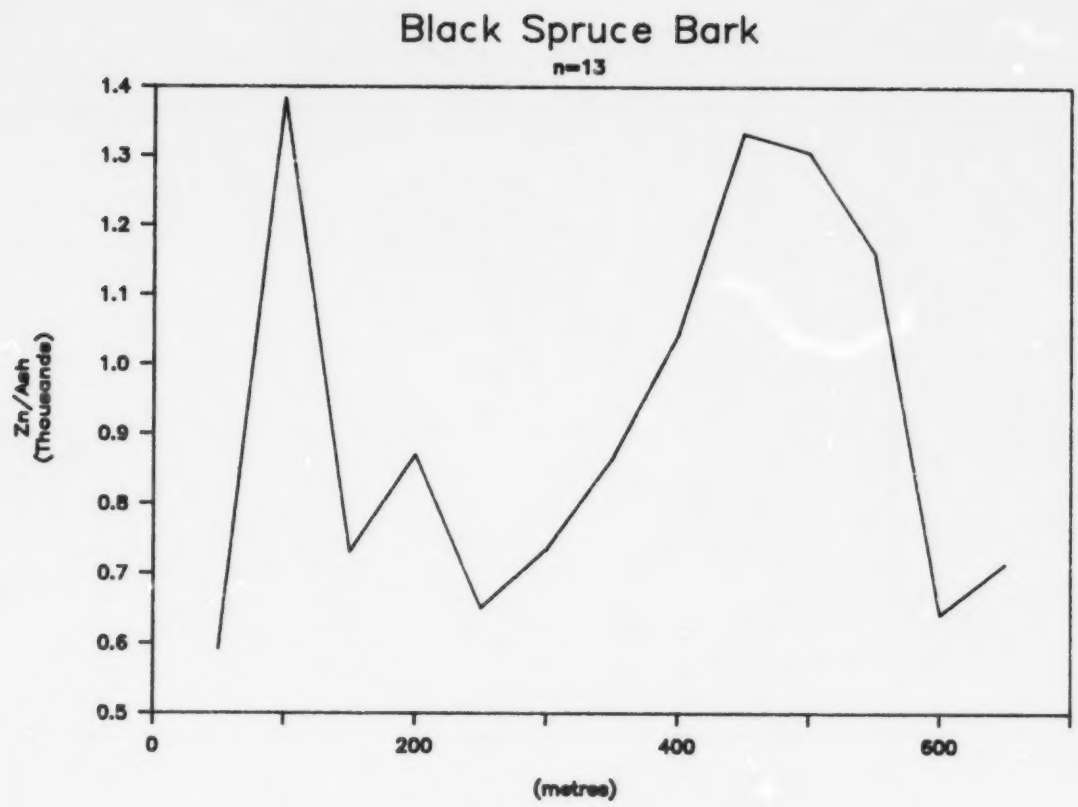
| Sample Number | Distan (m) | (Cr/Ash) /Mn | (Fe/Ash) /Mn | (Co/Ash) /Mn | (Ni/Ash) /Mn | (Cu/Ash) /Mn | (Zn/Ash) /Mn | (Pb/Ash) /Mn |
|---|---|---|---|---|---|---|---|---|
| B851 | 50 | 0.00068 | 0.04931 | 0.00014 | 0.00038 | 0.00175 | 0.07191 | 0.00743 |
| B852 | 100 | 0.00179 | 0.07465 | 0.00022 | 0.00060 | 0.00422 | 0.17743 | 0.00903 |
| B853 | 150 | 0.00108 | 0.06327 | 0.00012 | 0.00025 | 0.00229 | 0.09366 | 0.00333 |
| B854 | 200 | 0.00135 | 0.05398 | 0.00020 | 0.00034 | 0.00317 | 0.16734 | 0.00412 |
| B855 | 250 | 0.00116 | 0.09385 | 0.00025 | 0.00042 | 0.00307 | 0.18605 | 0.00316 |
| B856 | 300 | 0.00048 | 0.02220 | 0.00004 | 0.00016 | 0.00133 | 0.10492 | 0.00101 |
| B857 | 350 | 0.00043 | 0.02162 | 0.00007 | 0.00014 | 0.00144 | 0.09945 | 0.00148 |
| B858 | 400 | 0.00038 | 0.03055 | 0.00008 | 0.00011 | 0.00134 | 0.09712 | 0.00115 |
| B859 | 450 | 0.00044 | 0.03259 | 0.00007 | 0.00019 | 0.00196 | 0.13333 | 0.00163 |
| B8510 | 500 | 0.00040 | 0.02100 | 0.00007 | 0.00017 | 0.00170 | 0.13067 | 0.00130 |
| B8511 | 550 | 0.00038 | 0.01966 | 0.00009 | 0.00012 | 0.00129 | 0.10326 | 0.00111 |
| B8512 | 600 | 0.00036 | 0.02098 | 0.00007 | 0.00011 | 0.00121 | 0.08677 | 0.00085 |
| B8513 | 650 | 0.00030 | 0.02001 | 0.00015 | 0.00011 | 0.00151 | 0.09663 | 0.00087 |

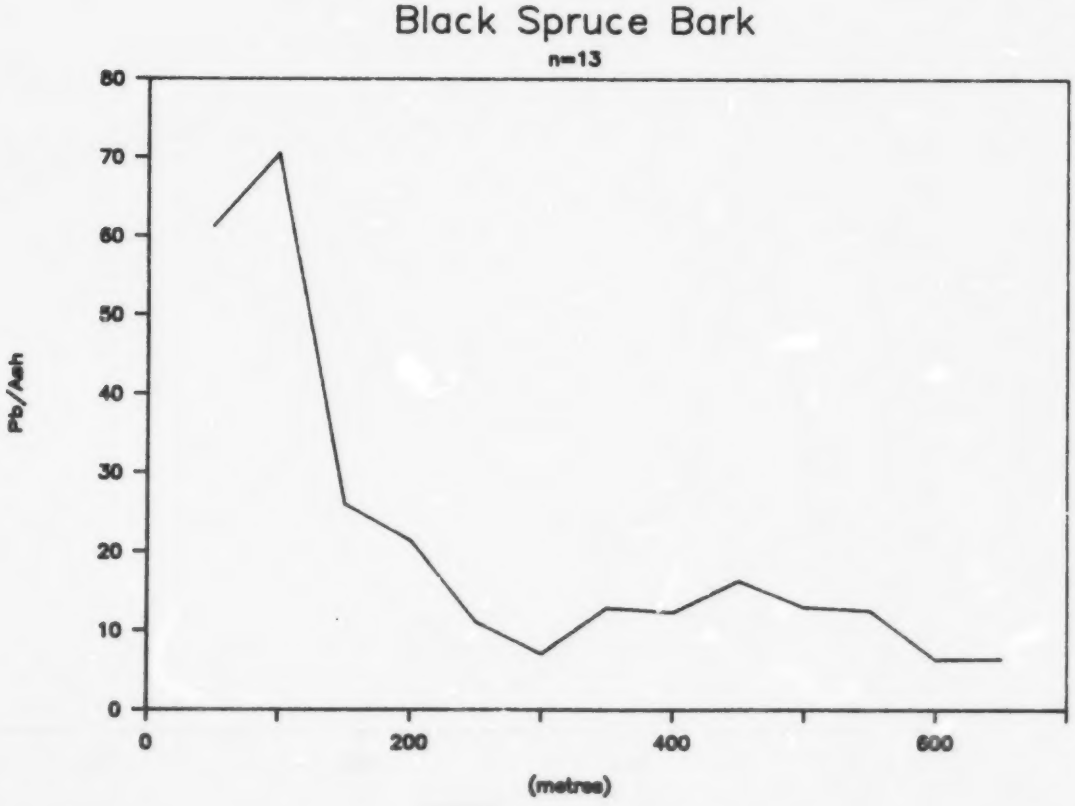

Black Spruce Bark
n=13
Fe/Ash
600
550
500
450
400
350
300
250
200
150
100
0
200
400
600
(metres)

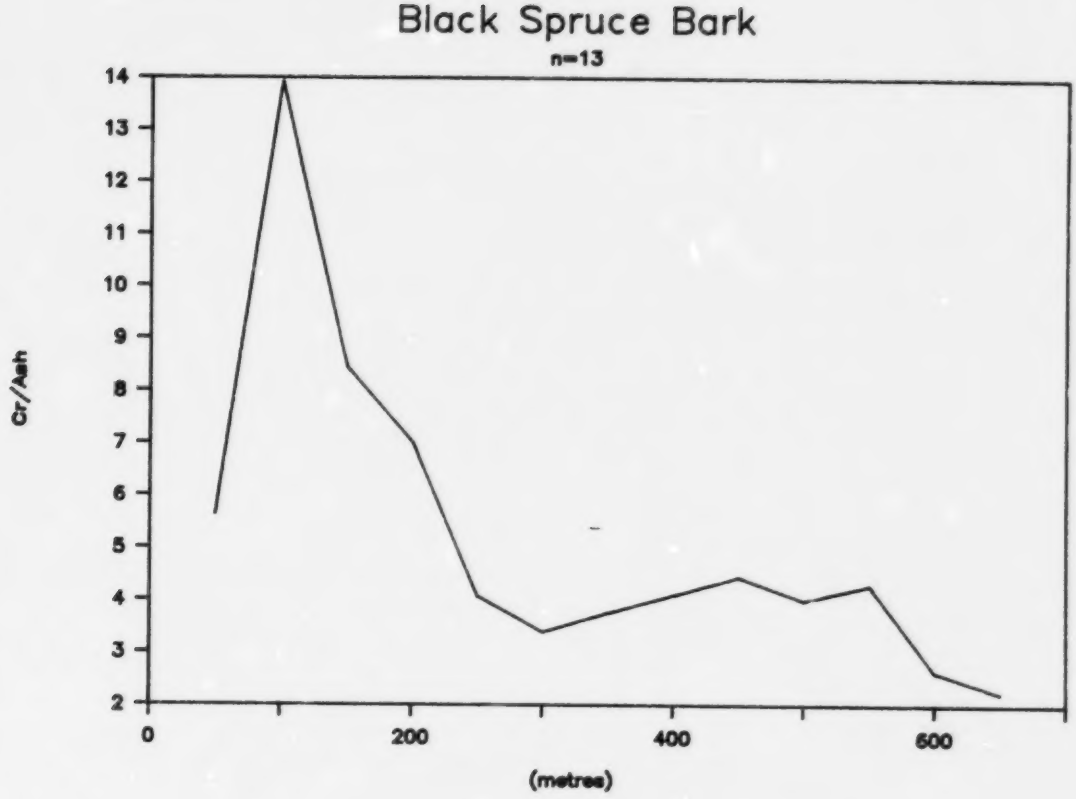

Black Spruce Bark
n=13
Co/Ash
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0
200
400
600
(metres)

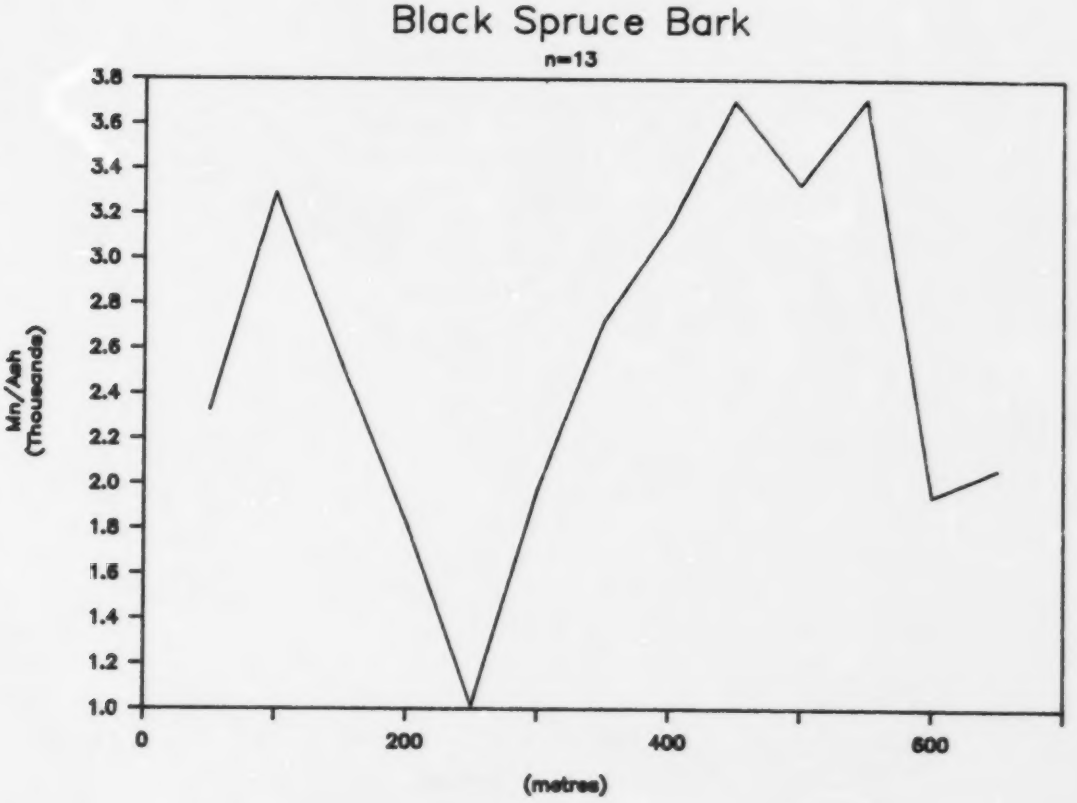

Black Spruce Bark
n=13
Ni/Ash
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
200
400
600
(metres)

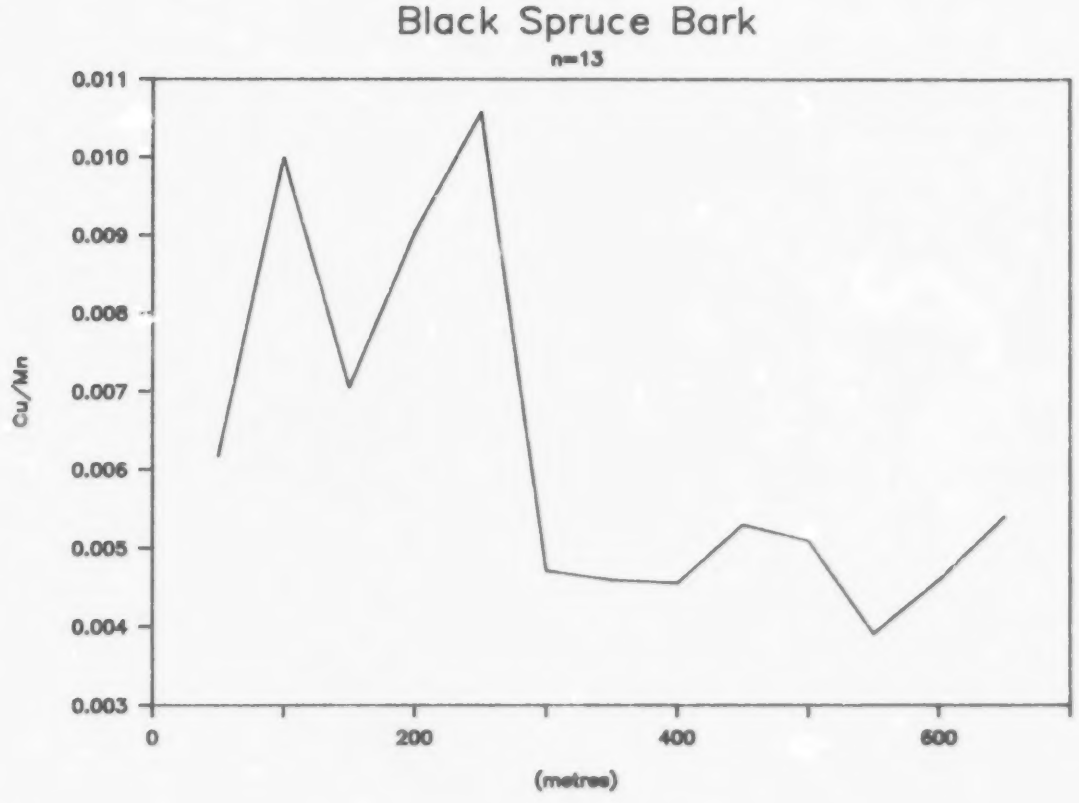

Black Spruce Bark
n=13
Cu/Ash
34
32
30
28
26
24
22
20
18
16
14
12
10
8
0
200
400
600
(metres)

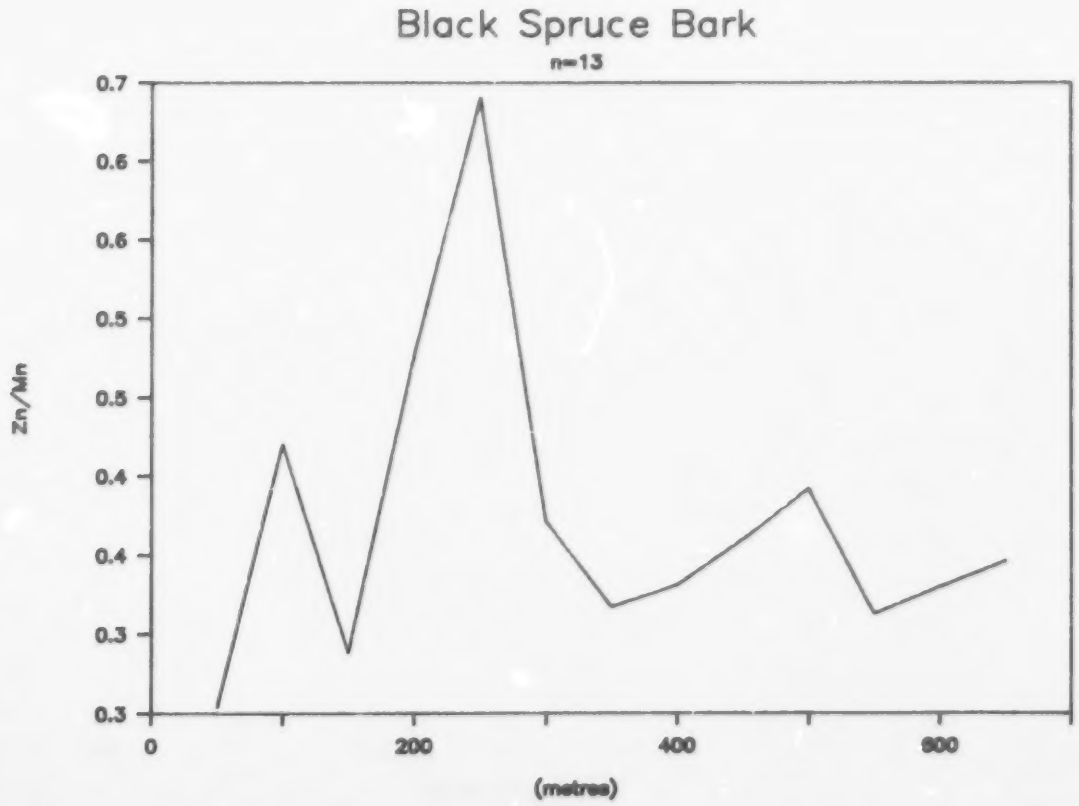

Black Spruce Bark
n=13
Zn/Ash
(Thousands)
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0
200
400
600
(metres)

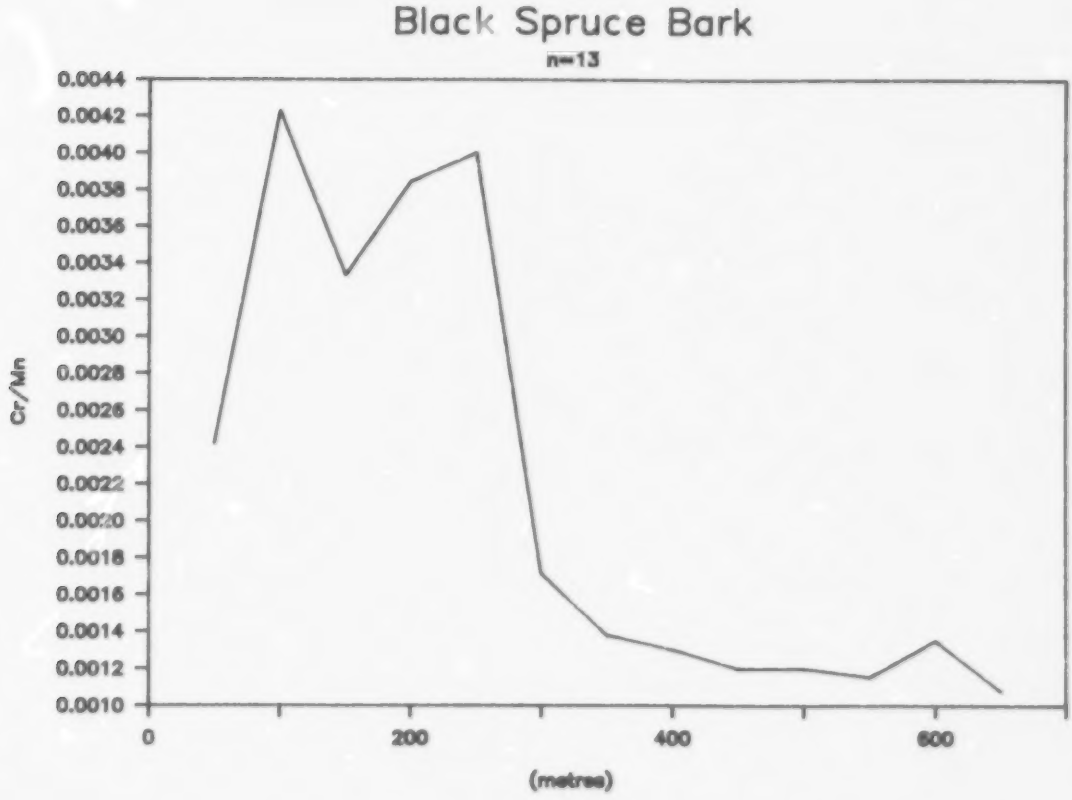

Black Spruce Bark
n=13
Pb/Ash
80
70
60
50
40
30
20
10
0
0
200
400
600
(metres)

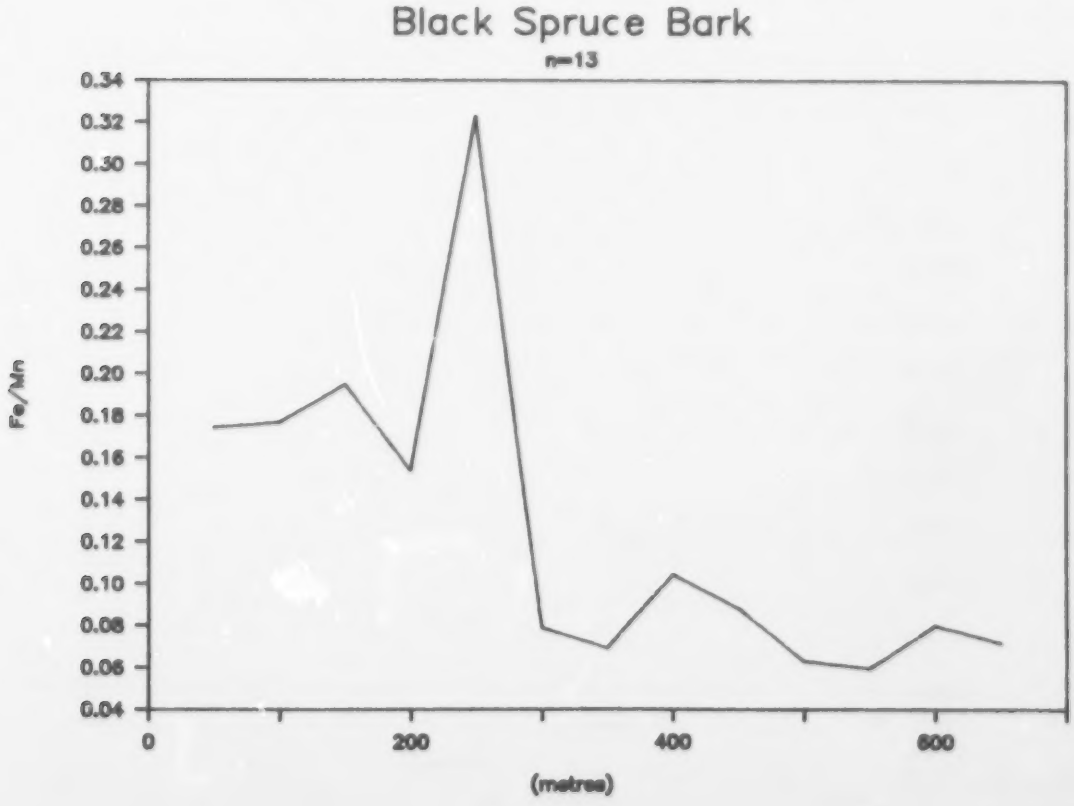

Black Spruce Bark
n=13
Cr/Ash
14
13
12
11
10
9
8
7
6
5
4
3
2
0
200
400
600
(metres)

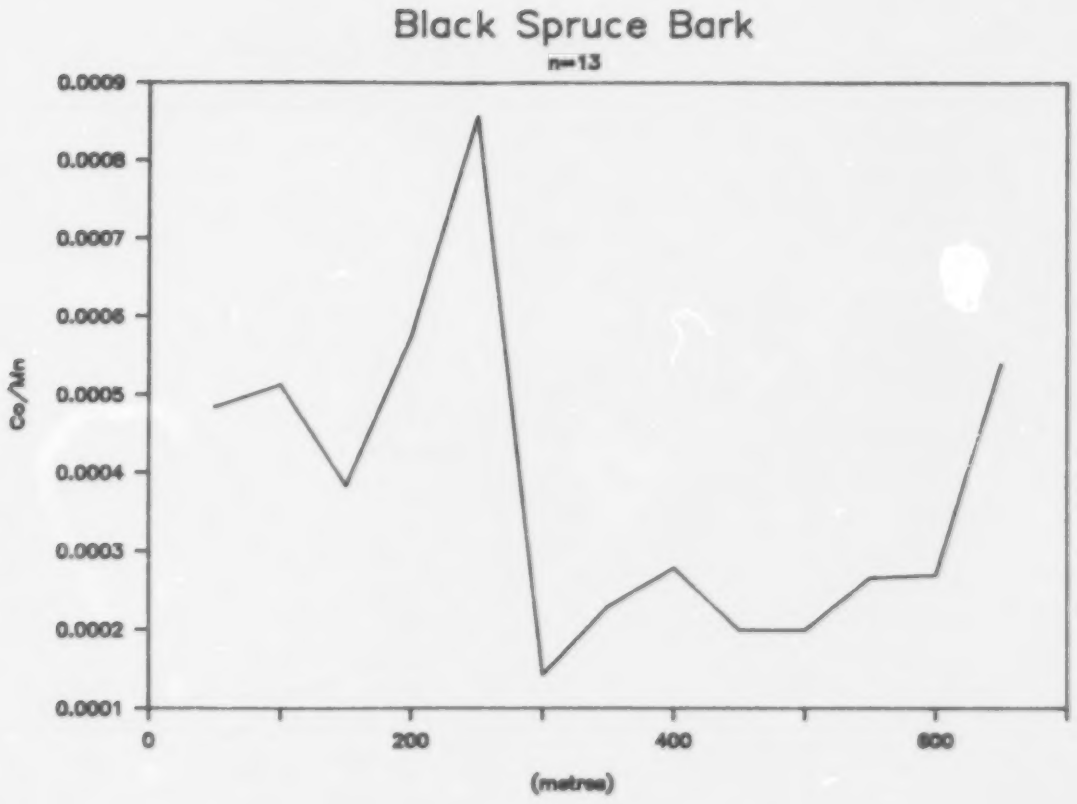

Black Spruce Bark
n=13
Mn/Ash
(Thousands)
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0
200
400
600
(metres)

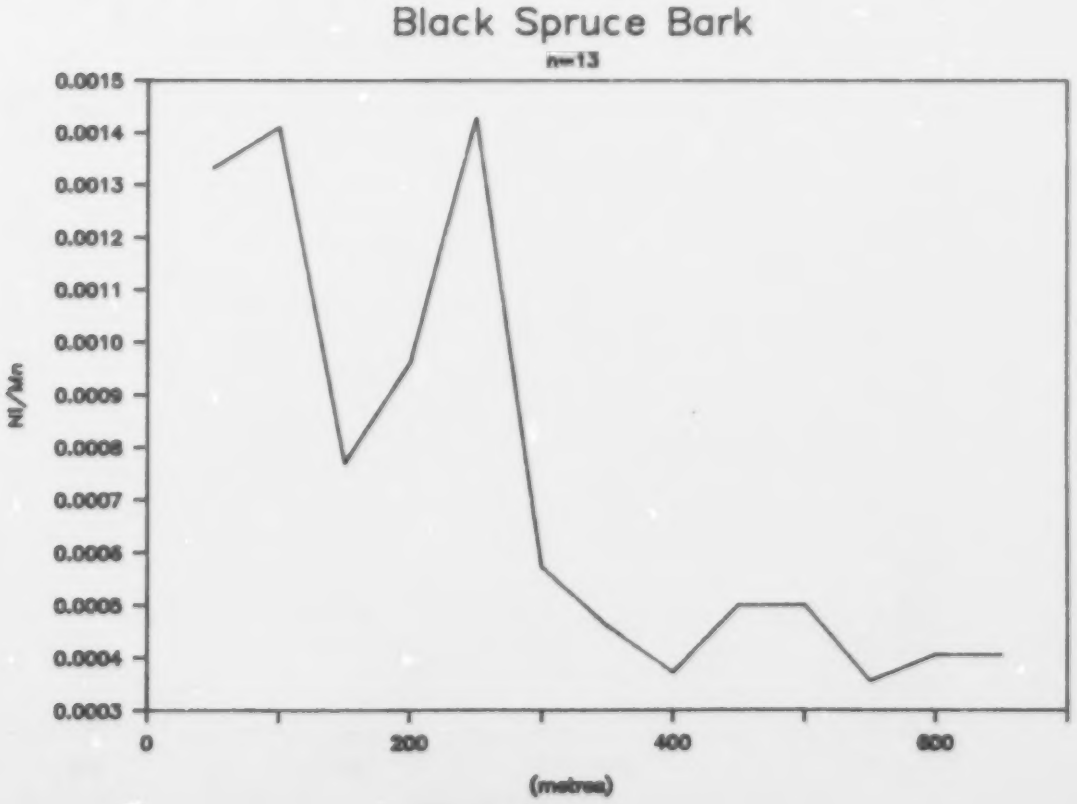

Black Spruce Bark
n=13
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
Cu/Mn
0
200
400
600
(metres)

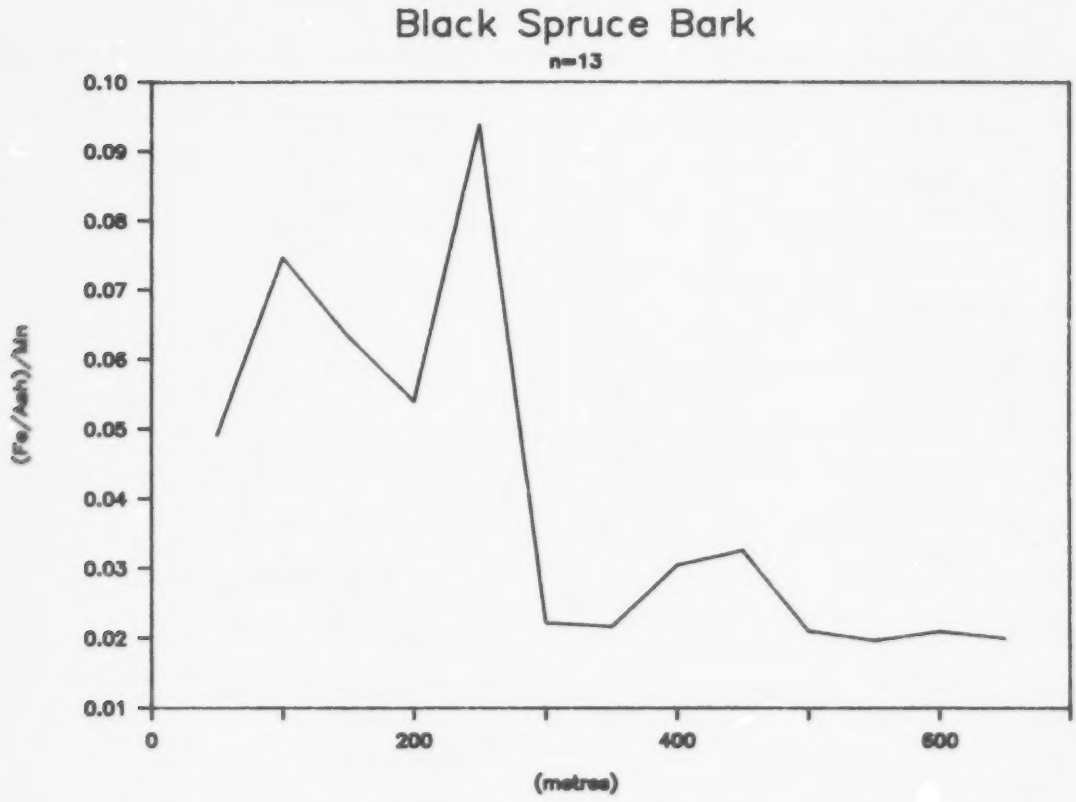

Black Spruce Bark
n=13
0.7
0.6
0.6
0.5
0.5
0.4
0.4
0.3
0.3
Zn/Mn
0
200
400
600
(metres)

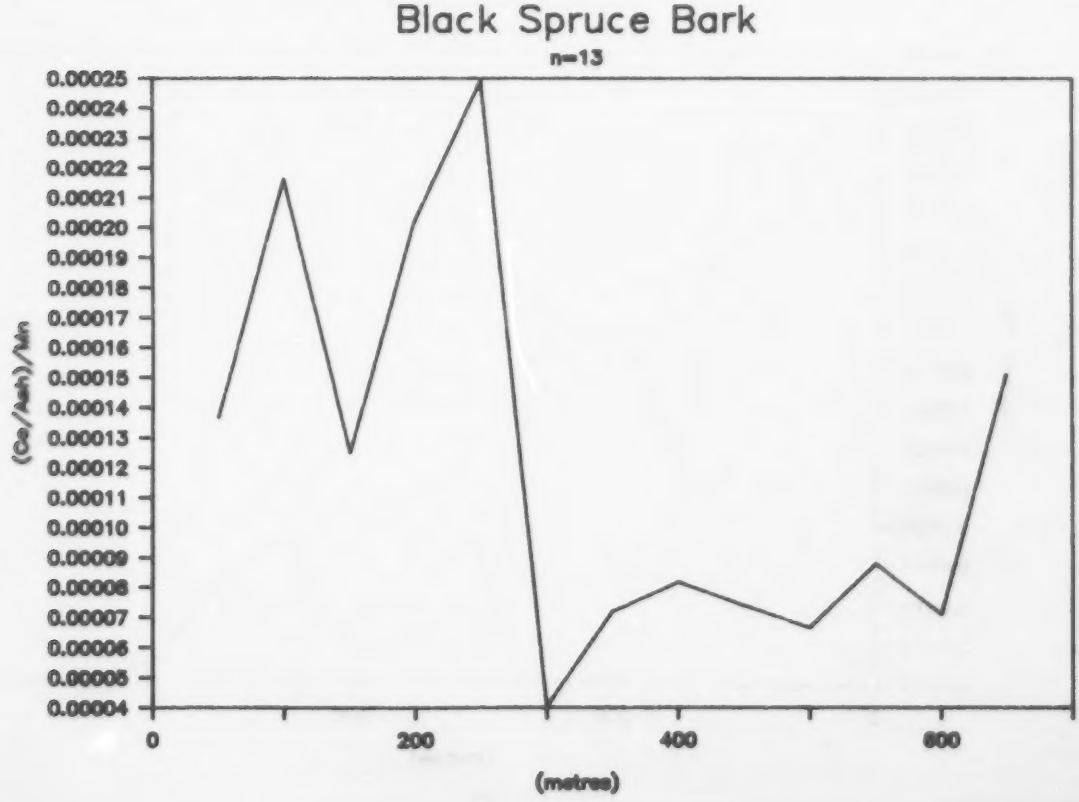

Black Spruce Bark
n=13
Cr/Mn
0.0044
0.0042
0.0040
0.0038
0.0036
0.0034
0.0032
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
0
200
400
600
(metres)

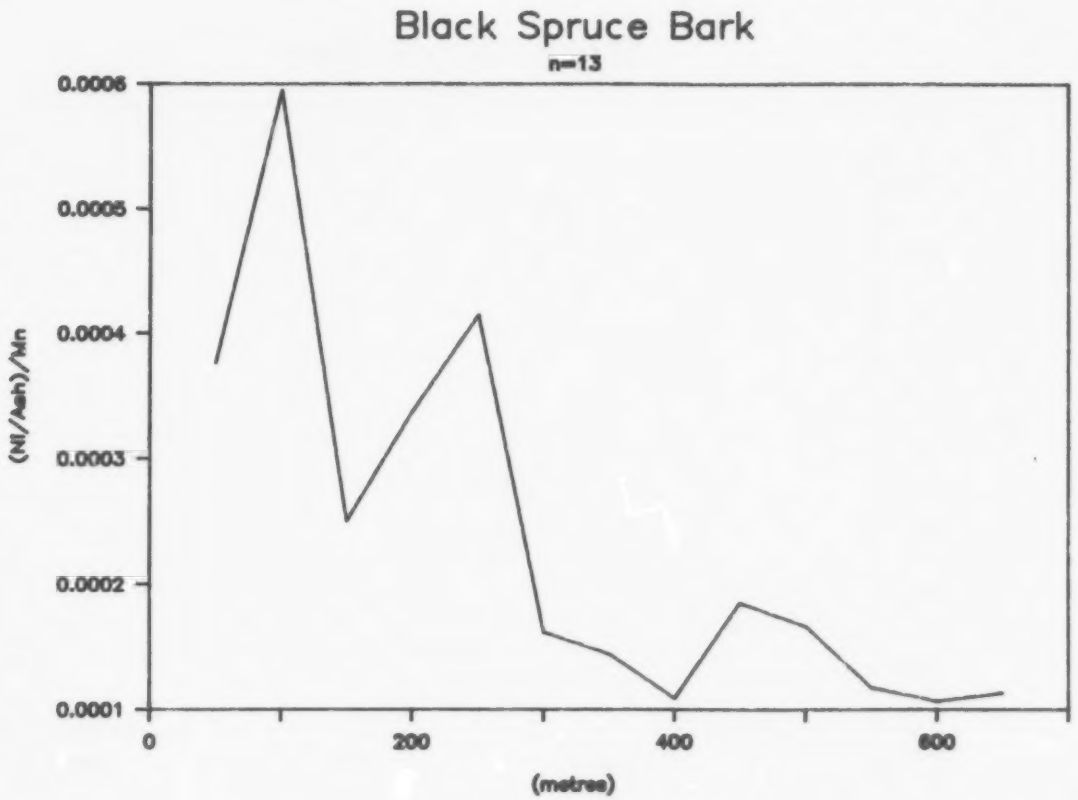

Black Spruce Bark
n=13
Fe/Mn
0.34
0.32
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0
200
400
600
(metres)

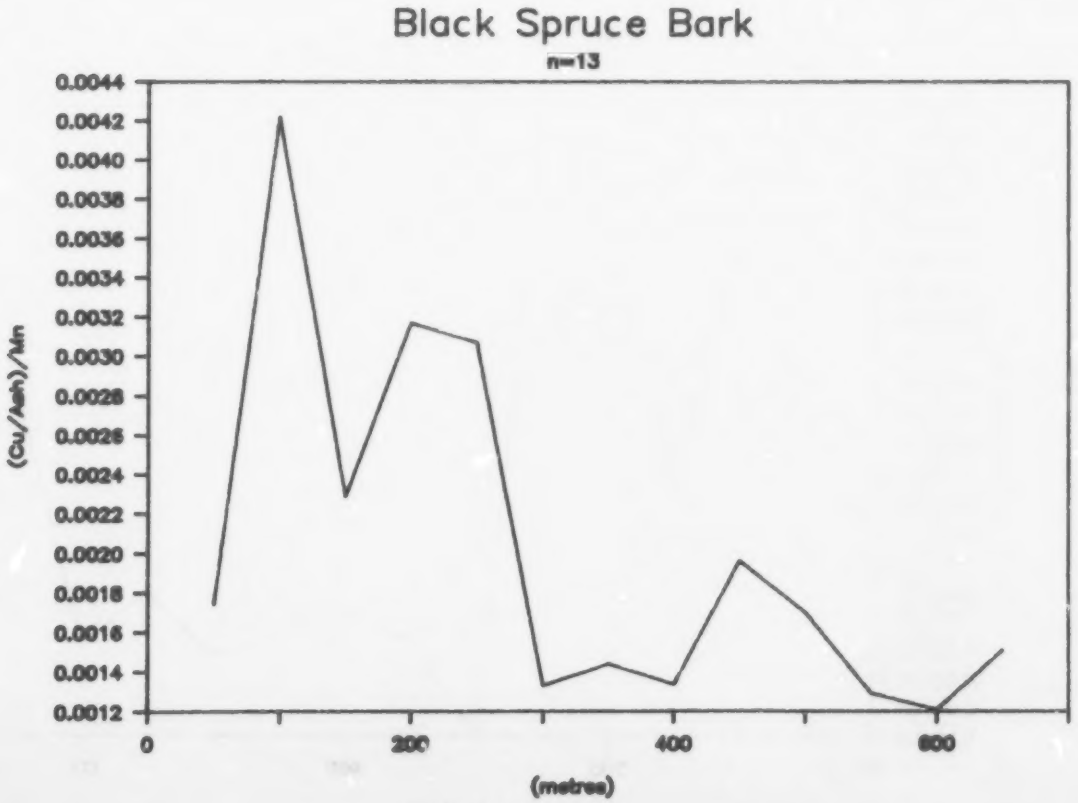

Black Spruce Bark
n=13
Co/Mn
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
200
400
600
(metres)

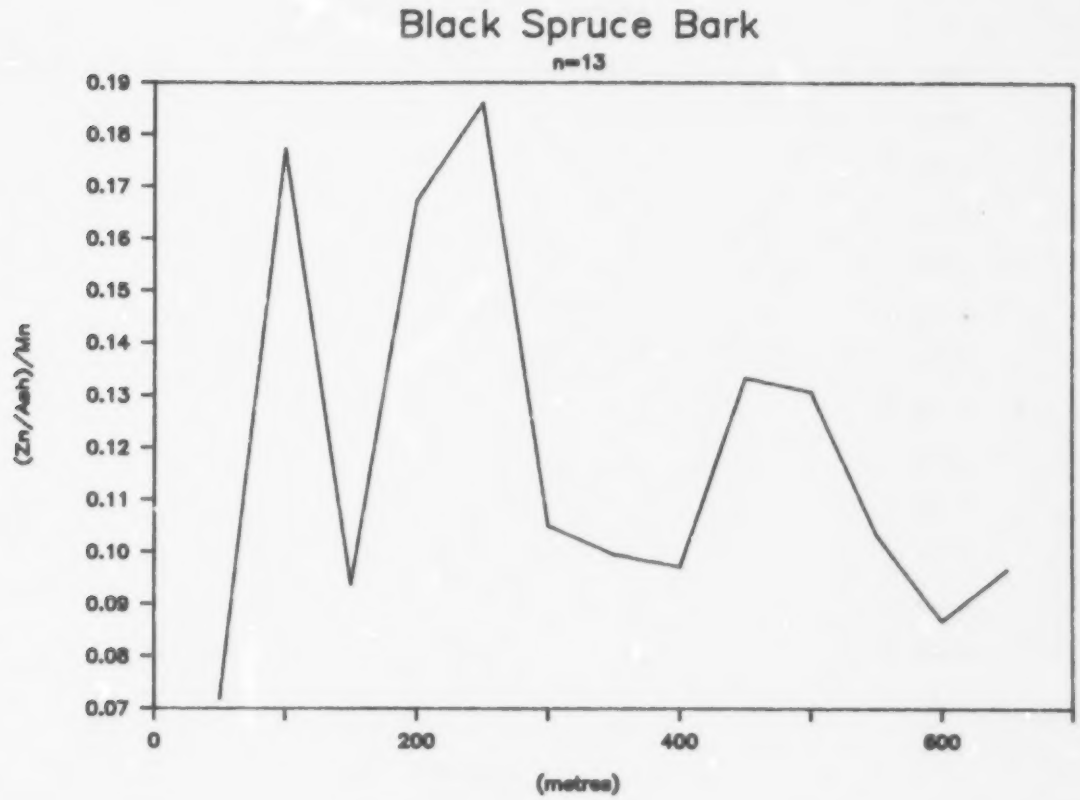

Black Spruce Bark
n=13
Ni/Mn
0.0015
0.0014
0.0013
0.0012
0.0011
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0
200
400
600
(metres)

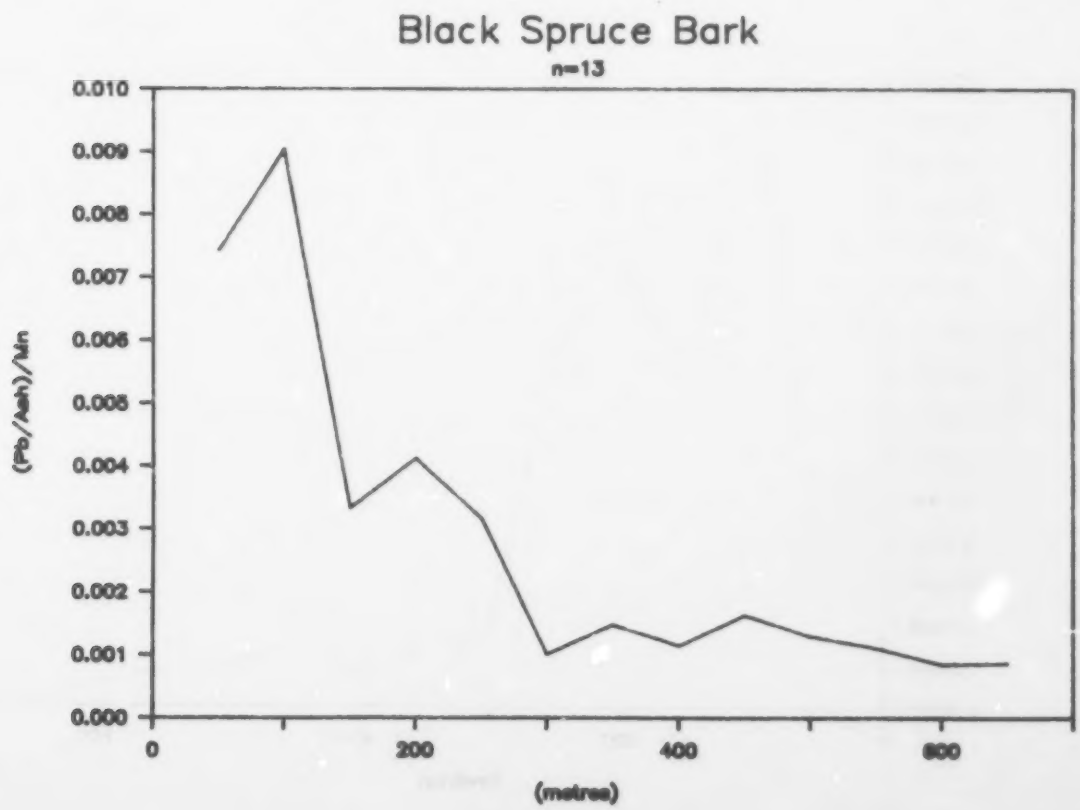

Black Spruce Bark
n=13
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
(Fe/Ash)/Mn
0
200
400
600
(metres)

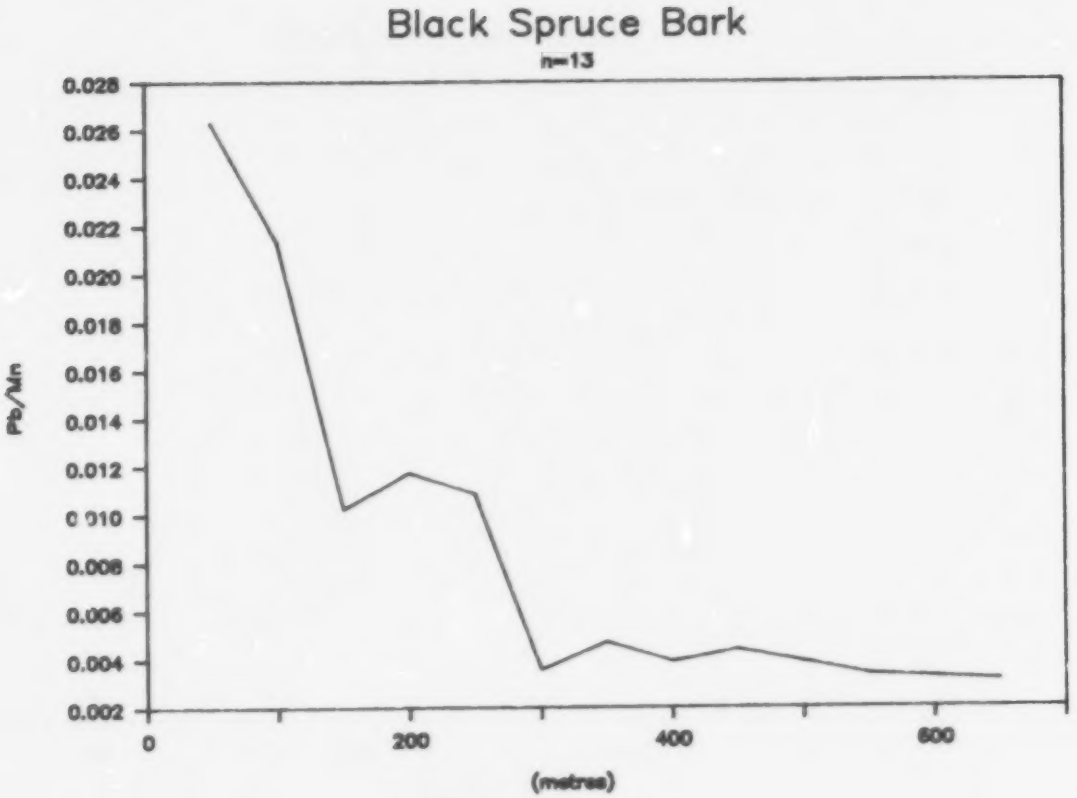

Black Spruce Bark
n=13
0.00025
0.00024
0.00023
0.00022
0.00021
0.00020
0.00019
0.00018
0.00017
0.00016
0.00015
0.00014
0.00013
0.00012
0.00011
0.00010
0.00009
0.00008
0.00007
0.00006
0.00005
0.00004
(Ca/Ash)/Mn
0
200
400
600
(metres)

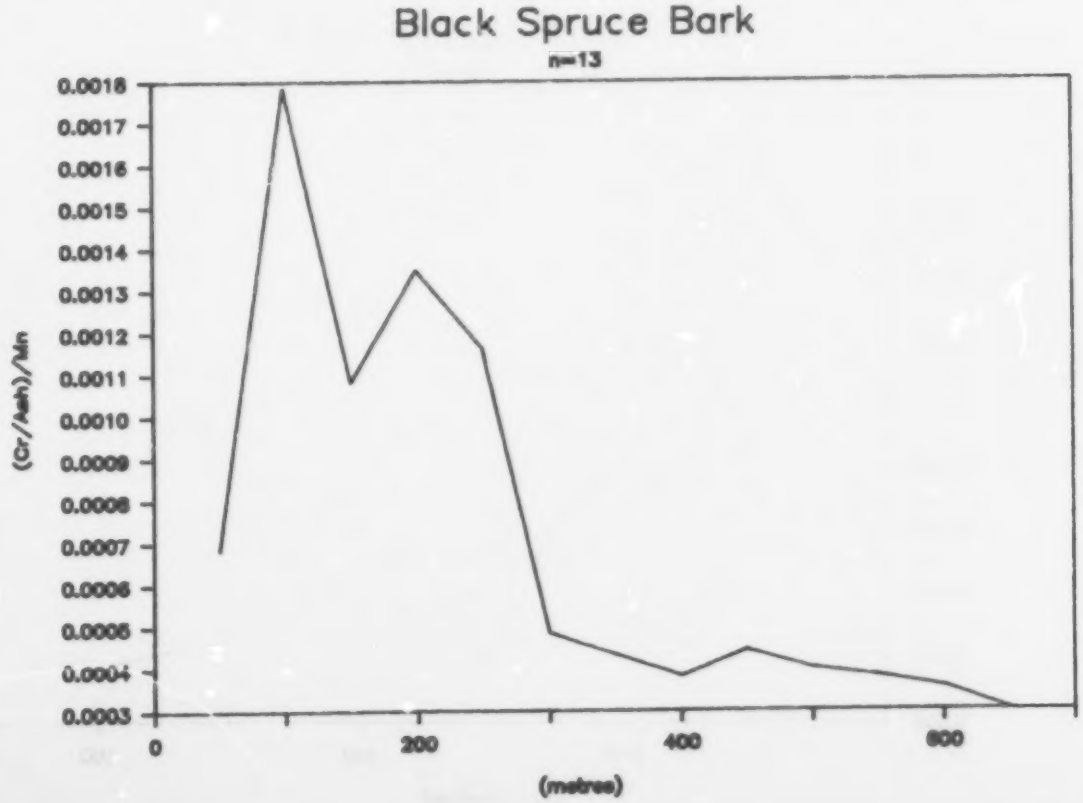

Black Spruce Bark
n=13
(Ni/Ash)/Mn
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
200
400
600
(metres)


Black Spruce Bark
n=13
(Cu/Ash)/Mn
0.0044
0.0042
0.0040
0.0038
0.0036
0.0034
0.0032
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
0.0018
0.0016
0.0014
0.0012
0
200
400
600
(metres)


Black Spruce Bark
n=13
(Zn/Ash)/Mn
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0
200
400
600
(metres)


Black Spruce Bark
n=13
(Pb/Ash)/Mn
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
0
200
400
600
(metres)


Black Spruce Bark
n=13
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
Pb/Mn
0
200
400
600
(metres)


Black Spruce Bark
n=13
0.0018
0.0017
0.0016
0.0015
0.0014
0.0013
0.0012
0.0011
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
(Cr/Ash)/Mn
0
200
400
600
(metres)

Dwarf Birch (Betula glandulosa) Twigs - Ashed

| Sample Number | Distance (m) | Cr (ppm) | Mn (ppm) | Fe (ppm) | Co (ppm) | Ni (ppm) | Cu (ppm) | Zn (ppm) | Pb (ppm) | Ba (ppm) | Ash (%) | Au (ppb) | As (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DB85-1 | 50 | 41 | 7730 | 6378 | 3 | 10 | 84 | 8649 | 68 | 2373 | 1.85 | 87 | 6.9 |
| DB85-2 | 100 | 29 | 8333 | 6389 | 7 | 10 | 65 | 6870 | 59 | 2222 | 2.16 | 63 | 4.6 |
| DB85-3 | 150 | 21 | 7143 | 5491 | 2 | 8 | 79 | 7116 | 50 | 1808 | 2.24 | 69 | 3.0 |
| DB85-4 | 200 | 16 | 4880 | 4520 | 6 | 7 | 65 | 7248 | 36 | 2184 | 2.50 | 59 | 3.4 |
| DB85-5 | 250 | 9 | 3735 | 2759 | 7 | 2 | 50 | 5801 | 29 | 1729 | 3.32 | 17 | 2.5 |
| DB85-6 | 300 | 13 | 5578 | 3307 | 3 | 4 | 67 | 10200 | 39 | 1761 | 2.51 | 27 | 2.5 |
| DB85-7 | 350 | 18 | 9689 | 3689 | 5 | 8 | 73 | 9573 | 43 | 1978 | 2.25 | 36 | 3.7 |
| DB85-8 | 400 | 17 | 8676 | 120000 | 3 | 4 | 80 | 11460 | 48 | 1583 | 2.04 | 69 | 5.8 |
| DB85-9 | 450 | 14 | 10910 | 3696 | 3 | 2 | 96 | 11960 | 50 | 1957 | 2.30 | 18 | 4.1 |
| DB85-10 | 500 | 13 | 10438 | 3577 | 3 | 9 | 79 | 10340 | 75 | 2259 | 2.74 | 30 | 6.3 |
| DB85-11 | 550 | 16 | 12830 | 5373 | 4 | 10 | 101 | 12080 | 69 | 2547 | 2.01 | 110 | 5.6 |
| DB85-12 | 600 | 17 | 9400 | 4292 | 8 | 6 | 81 | 10910 | 68 | 2262 | 2.33 | 26 | 5.1 |
| DB85-13 | 650 | 14 | 9752 | 4604 | 15 | 12 | 89 | 9376 | 69 | 1485 | 2.02 | 26 | 3.5 |

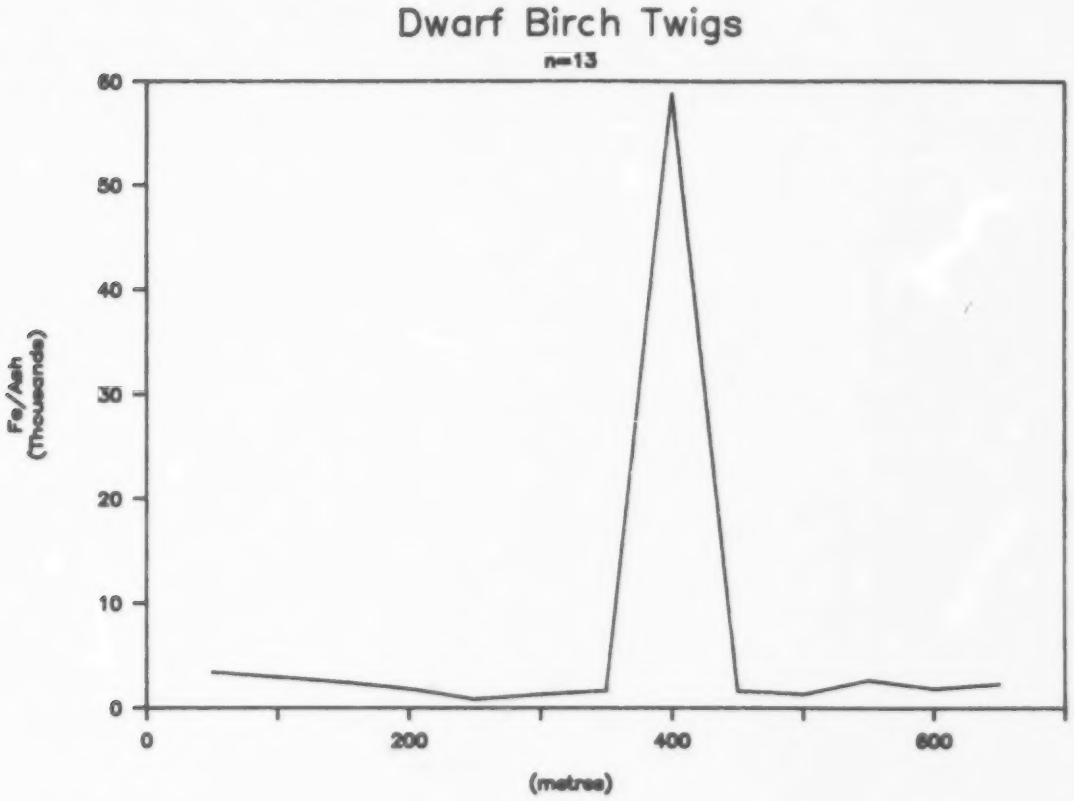
| Sample Number | Distance (m) | Cr/Ash | Mn/Ash | Fe/Ash | Co/Ash | Ni/Ash | Cu/Ash | Zn/Ash | Pb/Ash | Ba/Ash |
|---|---|---|---|---|---|---|---|---|---|---|
| DB85-1 | 50 | 22.2 | 4178.4 | 3447.6 | 1.6 | 5.4 | 45.4 | 4675.1 | 36.8 | 1282.7 |
| DB85-2 | 100 | 13.4 | 3857.9 | 2957.9 | 3.2 | 4.6 | 30.1 | 3180.6 | 27.3 | 1028.7 |
| DB85-3 | 150 | 9.4 | 3188.8 | 2451.3 | 0.9 | 3.6 | 35.3 | 3176.8 | 22.3 | 807.1 |
| DB85-4 | 200 | 6.4 | 1952.0 | 1808.0 | 2.4 | 2.8 | 26.0 | 2899.2 | 14.4 | 873.6 |
| DB85-5 | 250 | 2.7 | 1125.0 | 831.0 | 2.1 | 0.6 | 15.1 | 1747.3 | 8.7 | 520.8 |
| DB85-6 | 300 | 5.2 | 2222.3 | 1317.5 | 1.2 | 1.6 | 26.7 | 4063.7 | 15.5 | 701.6 |
| DB85-7 | 350 | 8.0 | 4306.2 | 1639.6 | 2.2 | 3.6 | 32.4 | 4254.7 | 19.1 | 879.1 |
| DB85-8 | 400 | 8.3 | 4252.9 | 58823.5 | 1.5 | 2.0 | 39.2 | 5617.6 | 23.5 | 776.0 |
| DB85-9 | 450 | 6.1 | 4743.5 | 1607.0 | 1.3 | 0.9 | 41.7 | 5200.0 | 21.7 | 850.9 |
| DB85-10 | 500 | 4.7 | 3809.5 | 1305.5 | 1.1 | 3.3 | 28.8 | 3773.7 | 27.4 | 824.5 |
| DB85-11 | 550 | 8.0 | 6383.1 | 2673.1 | 2.0 | 5.0 | 50.2 | 6010.0 | 34.3 | 1267.2 |
| DB85-12 | 600 | 7.3 | 4034.3 | 1842.1 | 3.4 | 2.6 | 34.8 | 4682.4 | 29.2 | 970.8 |
| DB85-13 | 650 | 6.9 | 4827.7 | 2279.2 | 7.4 | 5.9 | 44.1 | 4641.6 | 34.2 | 735.1 |

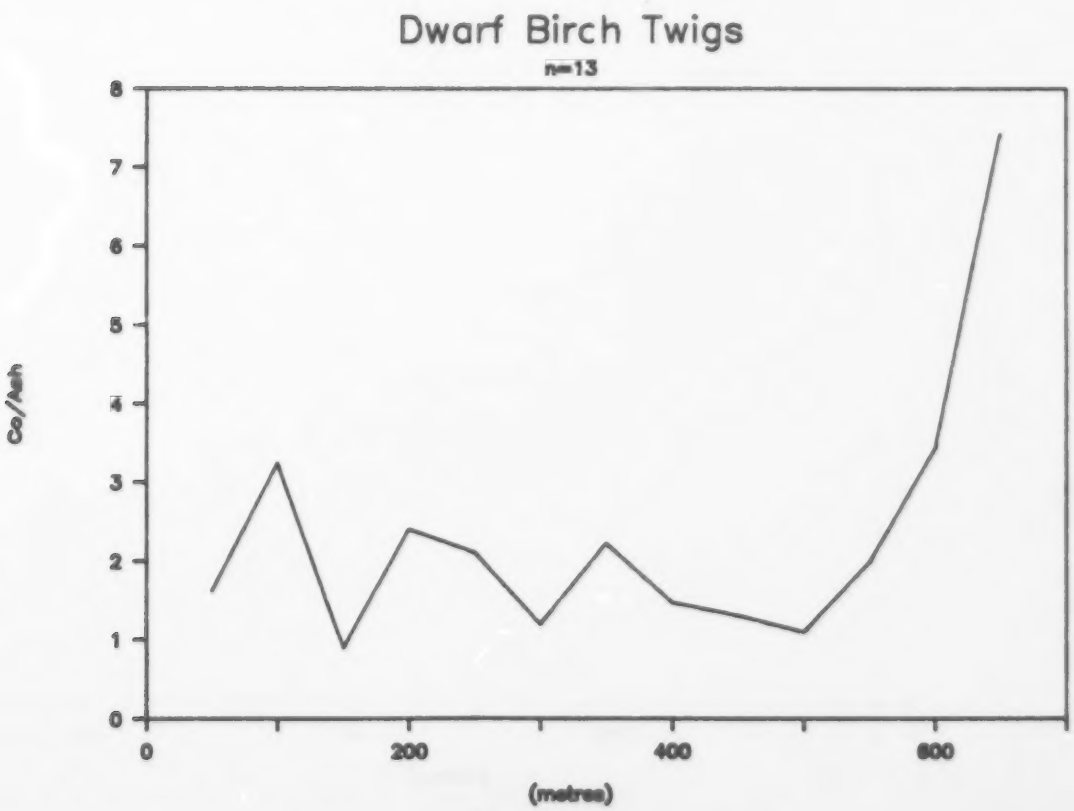
| Sample Number | Distance (m) | Cr/Mn | Fe/Mn | Co/Mn | Ni/Mn | Cu/Mn | Zn/Mn | Pb/Mn | Ba/Mn |
|---|---|---|---|---|---|---|---|---|---|
| DB85-1 | 50 | 0.0053 | 0.8251 | 0.0004 | 0.0013 | 0.0109 | 1.1189 | 0.0088 | 0.3070 |
| DB85-2 | 100 | 0.0035 | 0.7667 | 0.0008 | 0.0012 | 0.0078 | 0.8244 | 0.0071 | 0.2667 |
| DB85-3 | 150 | 0.0029 | 0.7687 | 0.0003 | 0.0011 | 0.0111 | 0.9962 | 0.0070 | 0.2531 |
| DB85-4 | 200 | 0.0033 | 0.9262 | 0.0012 | 0.0014 | 0.0133 | 1.4852 | 0.0074 | 0.4475 |
| DB85-5 | 250 | 0.0024 | 0.7387 | 0.0019 | 0.0005 | 0.0134 | 1.5531 | 0.0078 | 0.4629 |
| DB85-6 | 300 | 0.0023 | 0.5929 | 0.0005 | 0.0007 | 0.0120 | 1.8286 | 0.0070 | 0.3157 |
| DB85-7 | 350 | 0.0019 | 0.3807 | 0.0005 | 0.0008 | 0.0075 | 0.9880 | 0.0044 | 0.2041 |
| DB85-8 | 400 | 0.0020 | 13.8313 | 0.0003 | 0.0005 | 0.0092 | 1.3209 | 0.0055 | 0.1825 |
| DB85-9 | 450 | 0.0013 | 0.3388 | 0.0003 | 0.0002 | 0.0088 | 1.0962 | 0.0046 | 0.1794 |
| DB85-10 | 500 | 0.0012 | 0.3427 | 0.0003 | 0.0009 | 0.0076 | 0.9906 | 0.0072 | 0.2164 |
| DB85-11 | 550 | 0.0012 | 0.4188 | 0.0003 | 0.0008 | 0.0079 | 0.9415 | 0.0054 | 0.1985 |
| DB85-12 | 600 | 0.0018 | 0.4566 | 0.0009 | 0.0006 | 0.0086 | 1.1606 | 0.0072 | 0.2406 |
| DB85-13 | 650 | 0.0014 | 0.4721 | 0.0015 | 0.0012 | 0.0091 | 0.9614 | 0.0071 | 0.1523 |

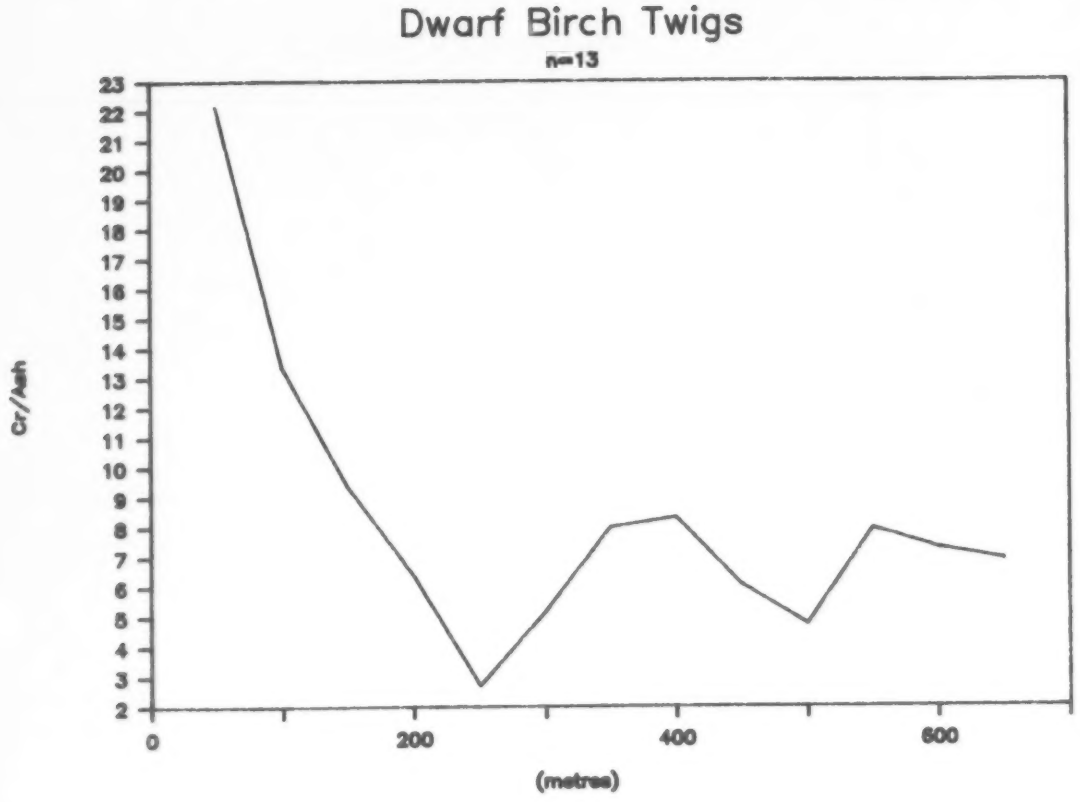
| Sample Number | Distance (m) | Cr/Ba | Mn/Ba | Fe/Ba | Co/Ba | Ni/Ba | Cu/Ba | Zn/Ba | Pb/Ba |
|---|---|---|---|---|---|---|---|---|---|
| DB85-1 | 50 | 0.0173 | 3.2575 | 2.6877 | 0.0013 | 0.0042 | 0.0354 | 3.6448 | 0.0287 |
| DB85-2 | 100 | 0.0131 | 3.7502 | 2.8753 | 0.0032 | 0.0045 | 0.0293 | 3.0918 | 0.0266 |
| DB85-3 | 150 | 0.0116 | 3.9508 | 3.0371 | 0.0011 | 0.0044 | 0.0437 | 3.9358 | 0.0277 |
| DB85-4 | 200 | 0.0073 | 2.2344 | 2.0696 | 0.0027 | 0.0032 | 0.0298 | 3.3187 | 0.0165 |
| DB85-5 | 250 | 0.0052 | 2.1602 | 1.5957 | 0.0040 | 0.0012 | 0.0289 | 3.3551 | 0.0168 |
| DB85-6 | 300 | 0.0074 | 3.1675 | 1.8779 | 0.0017 | 0.0023 | 0.0380 | 5.7922 | 0.0221 |
| DB85-7 | 350 | 0.0091 | 4.8984 | 1.8650 | 0.0025 | 0.0040 | 0.0369 | 4.8397 | 0.0217 |
| DB85-8 | 400 | 0.0107 | 5.4807 | 75.8054 | 0.0019 | 0.0025 | 0.0505 | 7.2394 | 0.0303 |
| DB85-9 | 450 | 0.0072 | 5.5749 | 1.8886 | 0.0015 | 0.0010 | 0.0491 | 6.1114 | 0.0255 |
| DB85-10 | 500 | 0.0058 | 4.6206 | 1.5834 | 0.0013 | 0.0040 | 0.0350 | 4.5772 | 0.0332 |
| DB85-11 | 550 | 0.0063 | 5.0373 | 2.1095 | 0.0016 | 0.0039 | 0.0397 | 4.7428 | 0.0271 |
| DB85-12 | 600 | 0.0075 | 4.1556 | 1.8974 | 0.0035 | 0.0027 | 0.0358 | 4.8232 | 0.0301 |
| DB85-13 | 650 | 0.0094 | 6.5670 | 3.1003 | 0.0101 | 0.0081 | 0.0599 | 6.3138 | 0.0465 |

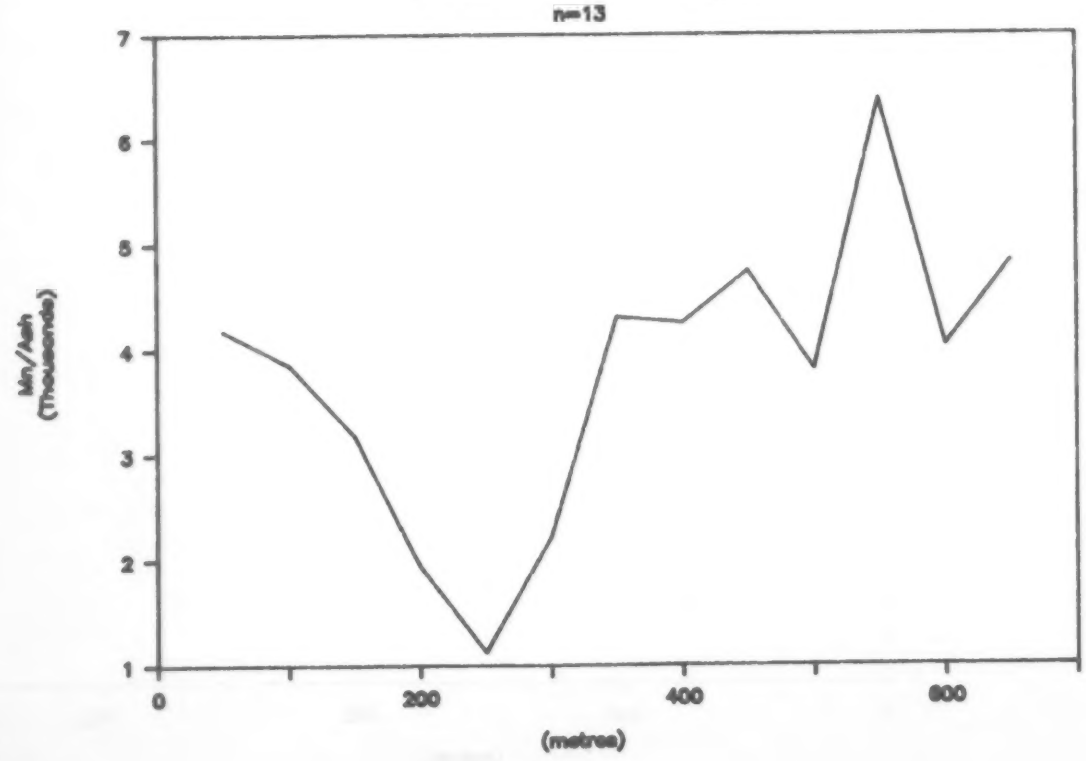
| Sample Number | Distance (m) | (Cr/Ash) /Mn | (Fe/Ash) /Mn | (Co/Ash) /Mn | (Ni/Ash) /Mn | (Cu/Ash) /Mn | (Zn/Ash) /Mn | (Pb/Ash) /Mn |
|---|---|---|---|---|---|---|---|---|
| DB85-1 | 50 | 0.00287 | 0.44600 | 0.00021 | 0.00070 | 0.00587 | 0.60480 | 0.00476 |
| DB85-2 | 100 | 0.00161 | 0.35496 | 0.00039 | 0.00056 | 0.00361 | 0.38168 | 0.00328 |
| DB85-3 | 150 | 0.00131 | 0.34318 | 0.00012 | 0.00050 | 0.00494 | 0.44474 | 0.00312 |
| DB85-4 | 200 | 0.00131 | 0.37049 | 0.00049 | 0.00057 | 0.00533 | 0.59410 | 0.00295 |
| DB85-5 | 250 | 0.00073 | 0.22250 | 0.00056 | 0.00016 | 0.00403 | 0.46782 | 0.00234 |
| DB85-6 | 300 | 0.00093 | 0.23620 | 0.00021 | 0.00029 | 0.00479 | 0.72853 | 0.00279 |
| DB85-7 | 350 | 0.00083 | 0.16922 | 0.00023 | 0.00037 | 0.00335 | 0.43912 | 0.00197 |
| DB85-8 | 400 | 0.00096 | 6.78003 | 0.00017 | 0.00023 | 0.00452 | 0.64749 | 0.00271 |
| DB85-9 | 450 | 0.00056 | 0.14729 | 0.00012 | 0.00008 | 0.00383 | 0.47663 | 0.00199 |
| DB85-10 | 500 | 0.00045 | 0.12507 | 0.00010 | 0.00031 | 0.00276 | 0.36154 | 0.00262 |
| DB85-11 | 550 | 0.00062 | 0.20835 | 0.00016 | 0.00039 | 0.00392 | 0.46843 | 0.00268 |
| DB85-12 | 600 | 0.00078 | 0.19596 | 0.00037 | 0.00027 | 0.00370 | 0.49813 | 0.00310 |
| DB85-13 | 650 | 0.00071 | 0.23372 | 0.00076 | 0.00061 | 0.00452 | 0.47596 | 0.00350 |

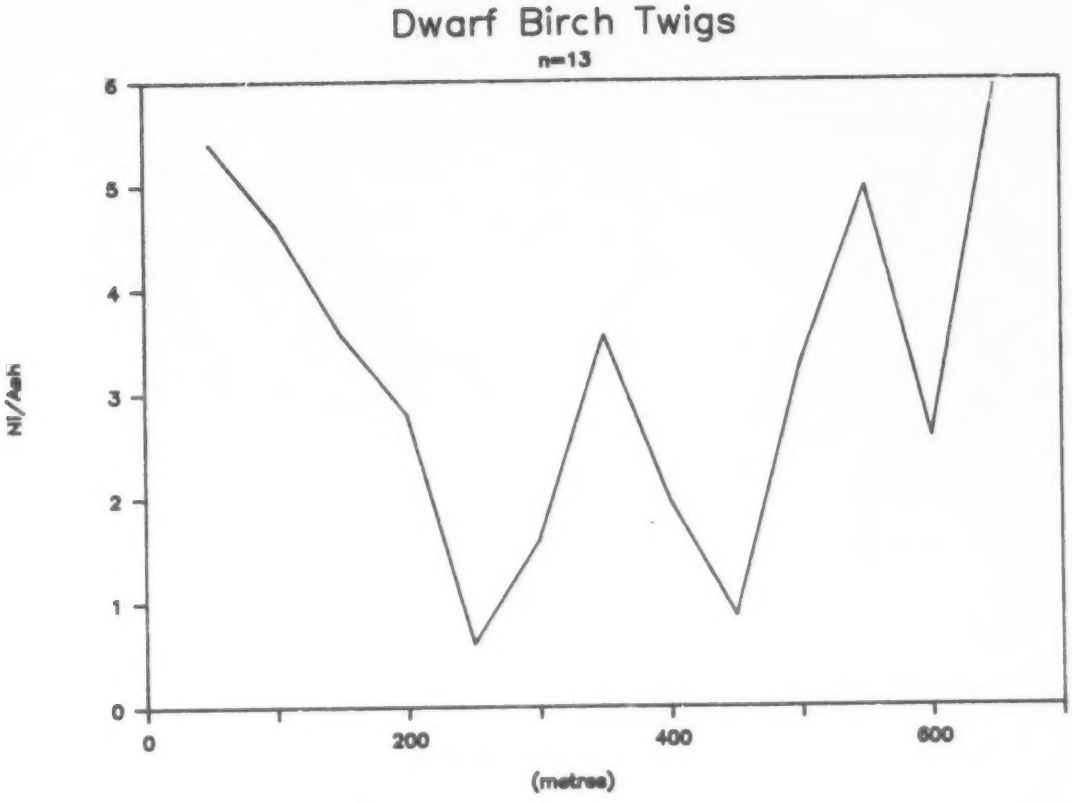
| Sample Number | Distance (m) | (Cr/Ash) /Ba | (Mn/Ash) /Ba | (Fe/Ash) /Ba | (Co/Ash) /Ba | (Ni/Ash) /Ba | (Cu/Ash) /Ba | (Zn/Ash) /Ba | (Pb/Ash) /Ba |
|---|---|---|---|---|---|---|---|---|---|
| DB85-1 | 50 | 0.00933 | 1.76079 | 1.452830 | 0.00068 | 0.00227 | 0.01913 | 1.97013 | 0.01548 |
| DB85-2 | 100 | 0.00604 | 1.73621 | 1.331174 | 0.00145 | 0.00208 | 0.01354 | 1.43139 | 0.01229 |
| DB85-3 | 150 | 0.00518 | 1.76373 | 1.355829 | 0.00049 | 0.00197 | 0.01950 | 1.75707 | 0.01234 |
| DB85-4 | 200 | 0.00293 | 0.89377 | 0.827838 | 0.00109 | 0.00128 | 0.01190 | 1.32747 | 0.00659 |
| DB85-5 | 250 | 0.00156 | 0.65066 | 0.480638 | 0.00121 | 0.00034 | 0.00871 | 1.01057 | 0.00505 |
| DB85-6 | 300 | 0.00294 | 1.26195 | 0.748171 | 0.00067 | 0.00090 | 0.01515 | 2.30763 | 0.00882 |
| DB85-7 | 350 | 0.00404 | 2.17705 | 0.828895 | 0.00112 | 0.00179 | 0.01640 | 2.15099 | 0.00966 |
| DB85-8 | 400 | 0.00526 | 2.68663 | 37.15952 | 0.00092 | 0.00123 | 0.02477 | 3.54873 | 0.01486 |
| DB85-9 | 450 | 0.00311 | 2.42385 | 0.821132 | 0.00066 | 0.00044 | 0.02132 | 2.65712 | 0.01110 |
| DB85-10 | 500 | 0.00210 | 1.68636 | 0.577899 | 0.00048 | 0.00145 | 0.01276 | 1.67052 | 0.01211 |
| DB85-11 | 550 | 0.00312 | 2.50611 | 1.049522 | 0.00078 | 0.00195 | 0.01972 | 2.35961 | 0.01347 |
| DB85-12 | 600 | 0.00322 | 1.78352 | 0.814350 | 0.00151 | 0.00113 | 0.01536 | 2.07002 | 0.01290 |
| DB85-13 | 650 | 0.00466 | 3.25099 | 1.534820 | 0.00500 | 0.00400 | 0.02966 | 3.12564 | 0.02300 |

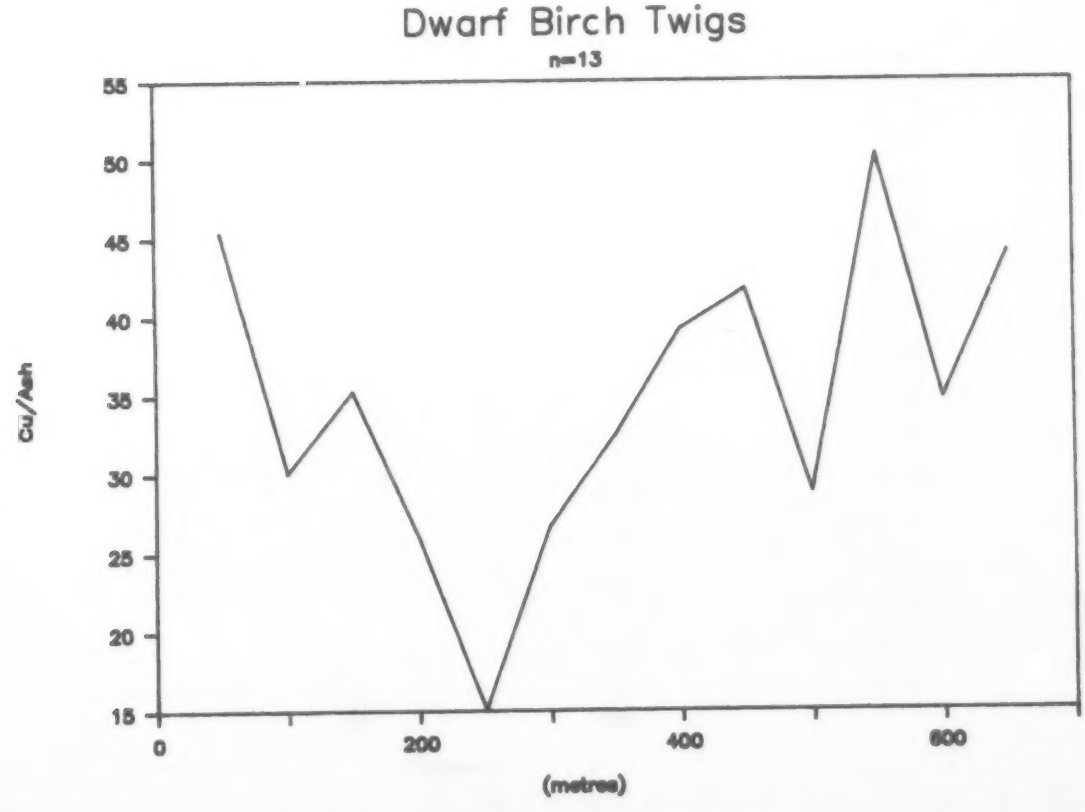

Dwarf Birch Twigs
n=13
Fe/Ash (Thousands)
60
50
40
30
20
10
0
0
200
400
600
(metres)

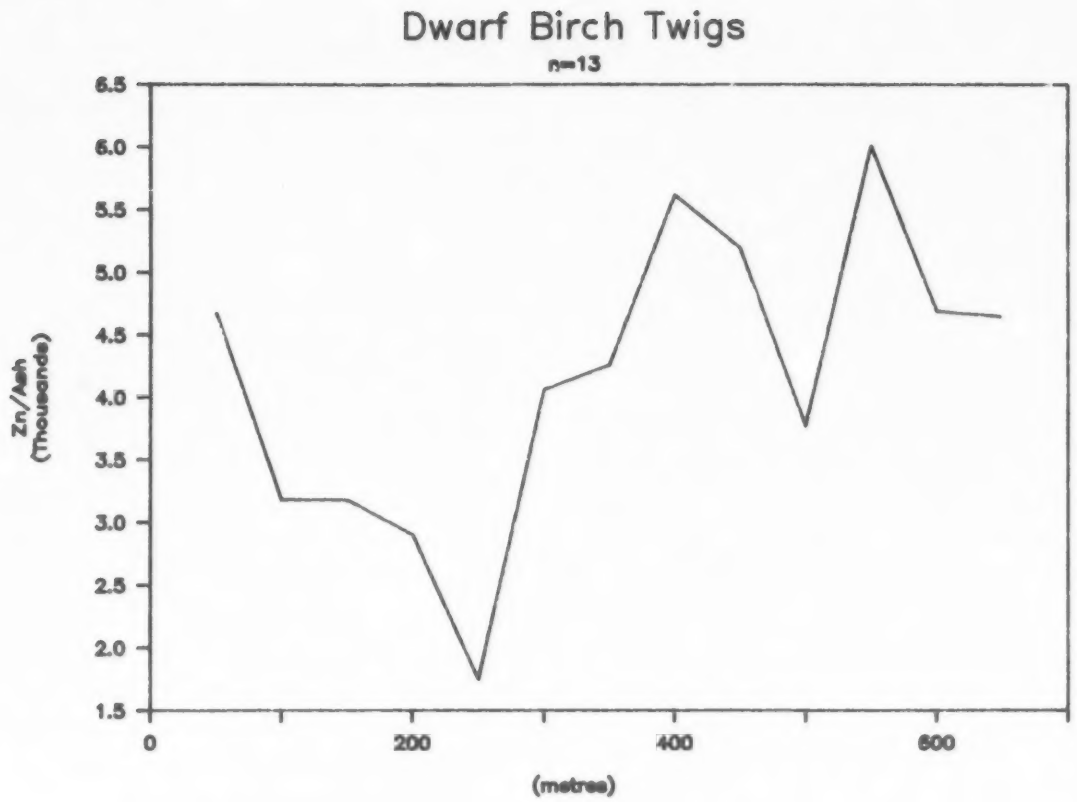

Dwarf Birch Twigs
n=13
Co/Ash
8
7
6
5
4
3
2
1
0
0
200
400
600
(metres)

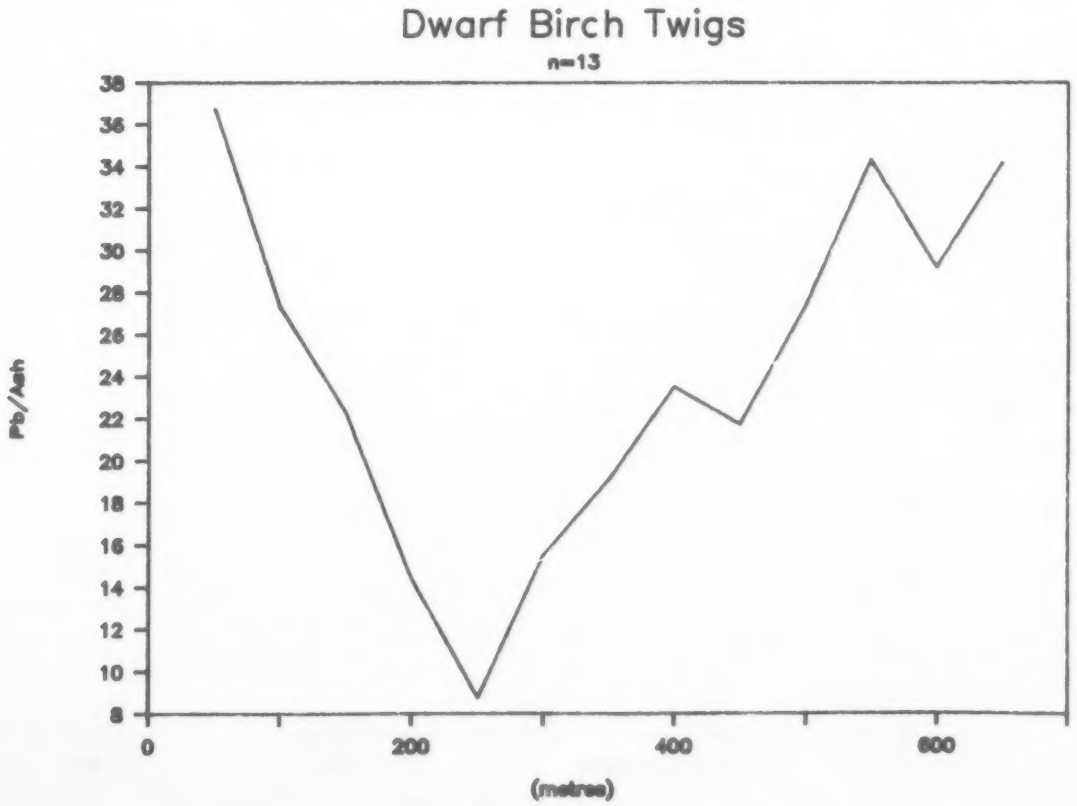

Dwarf Birch Twigs
n=13
Cr/Ash
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
0
200
400
600
(metres)

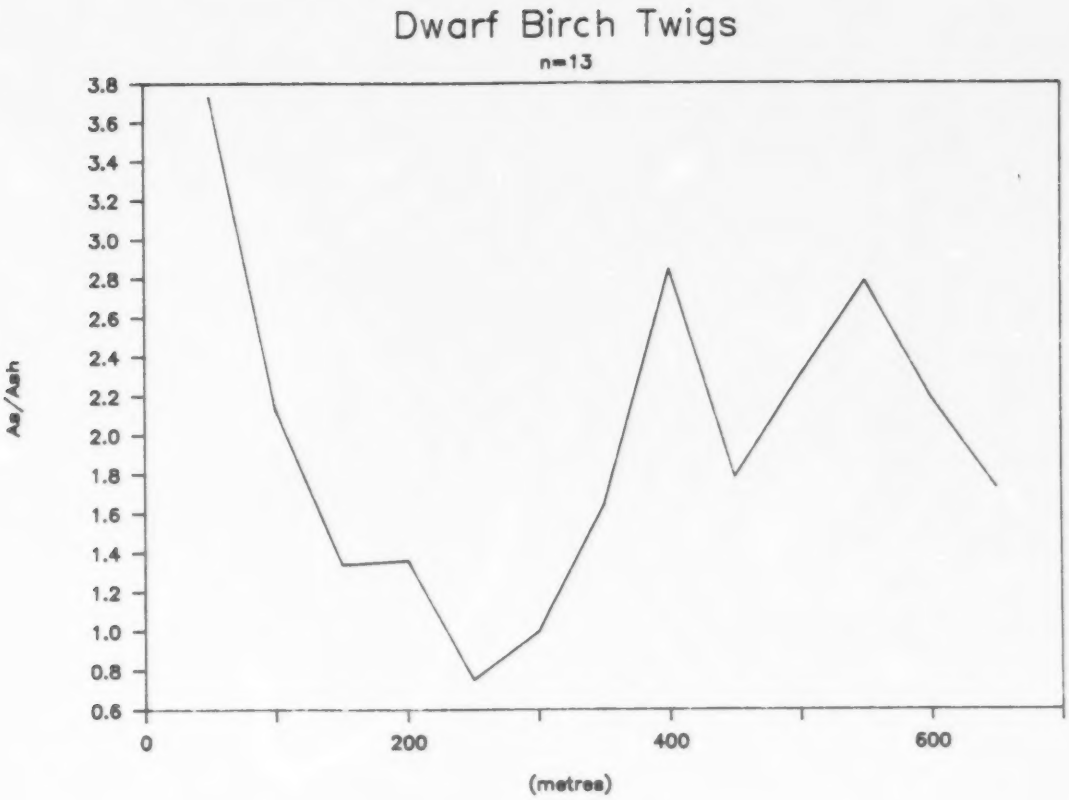

Dwarf Birch Twigs
n=13
Mn/Ash
(Thousands)
7
6
5
4
3
2
1
0
200
400
600
(metres)

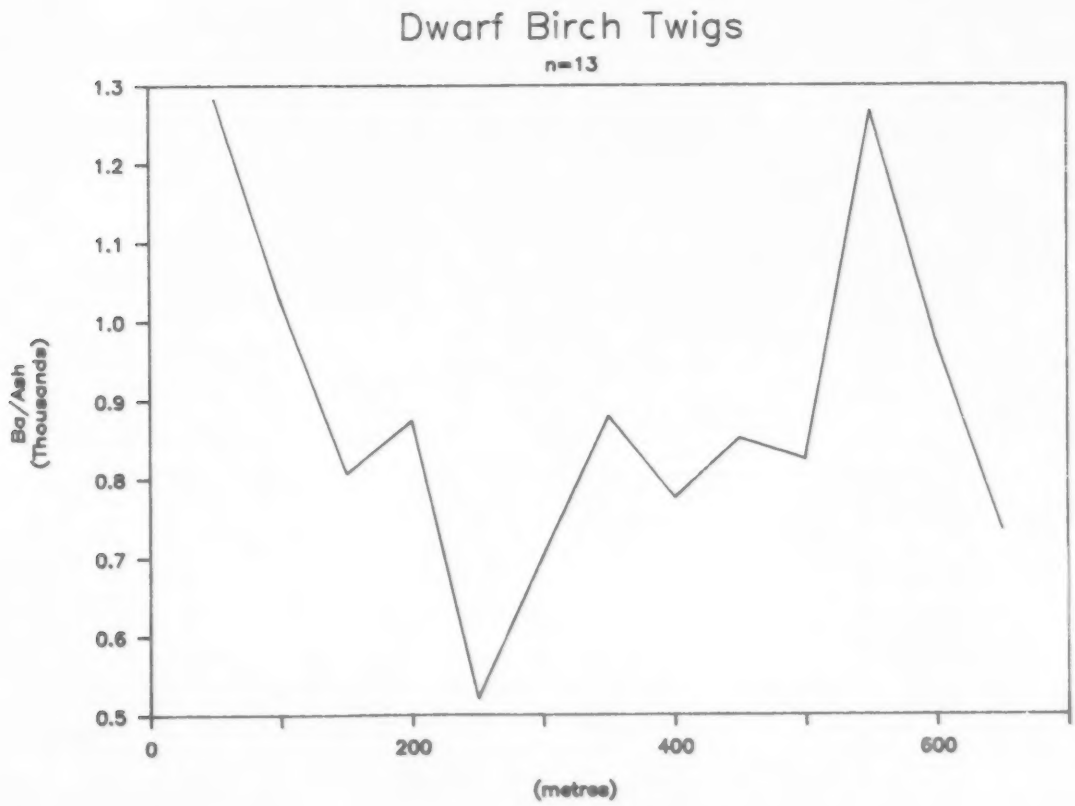

Dwarf Birch Twigs
n=13
Ni/Ash
0
1
2
3
4
5
6
0
200
400
600
(metres)

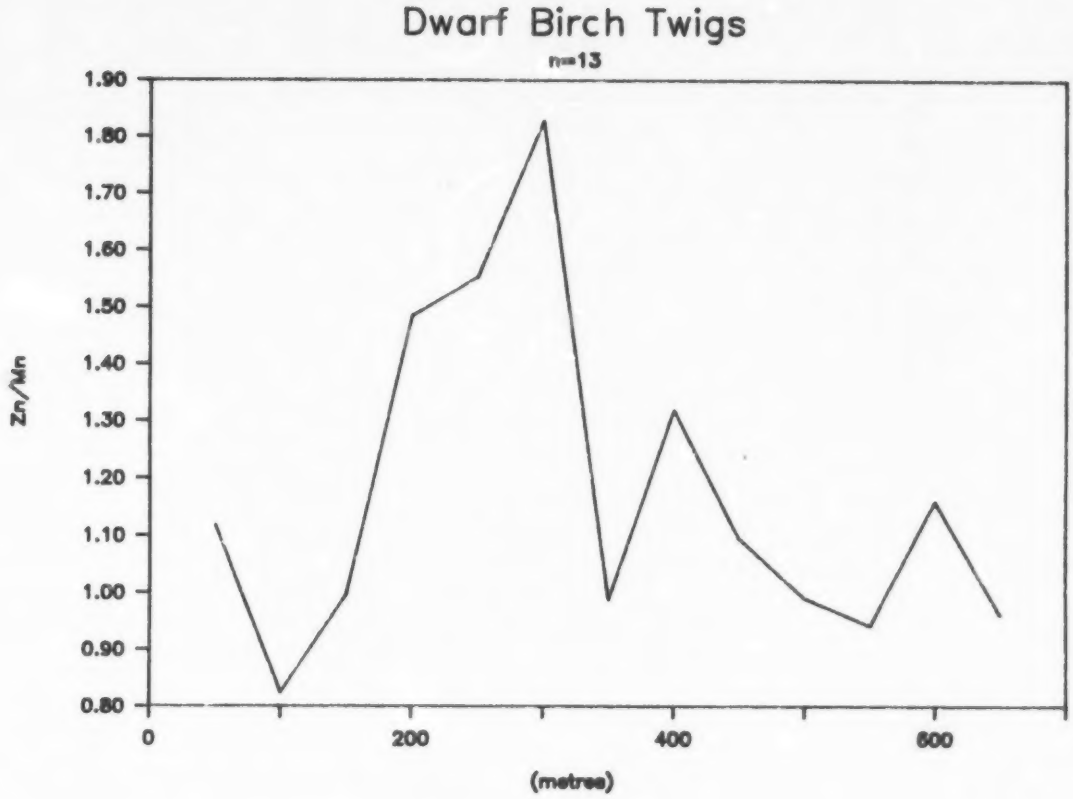

Dwarf Birch Twigs
n=13
Cu/Ash
15
20
25
30
35
40
45
50
55
0
200
400
600
(metres)

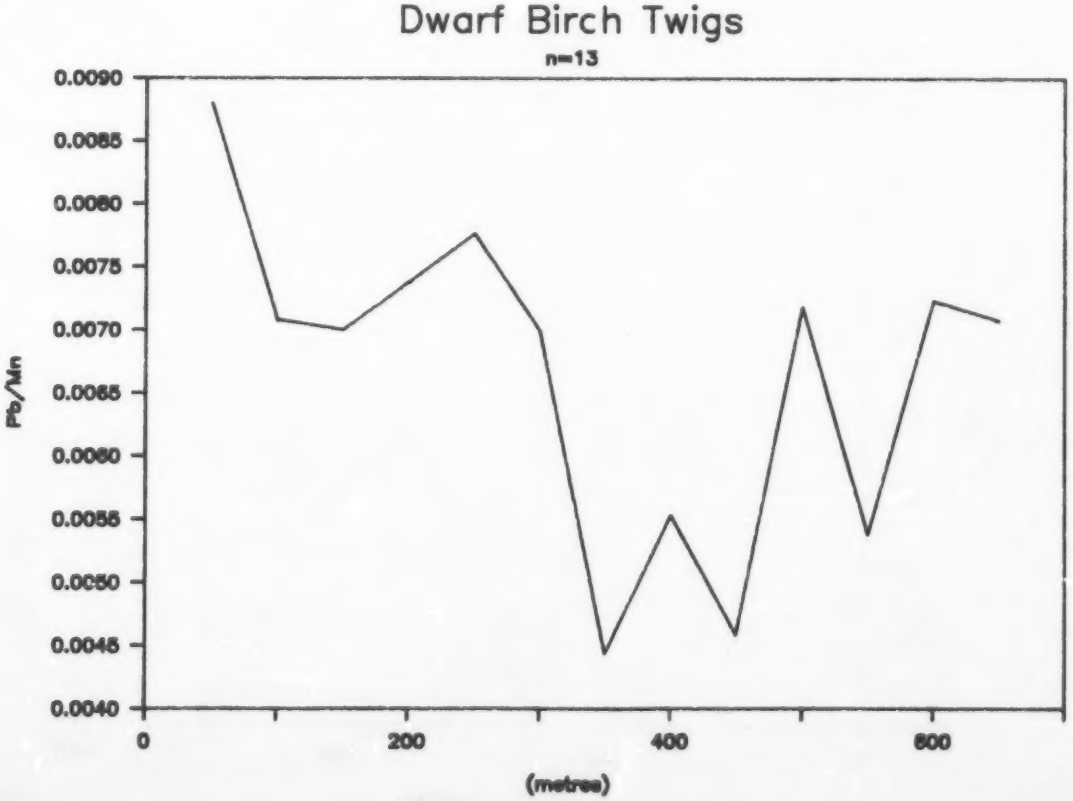

Dwarf Birch Twigs
n=13
Zn/Ash (Thousands)
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
0
200
400
600
(metres)

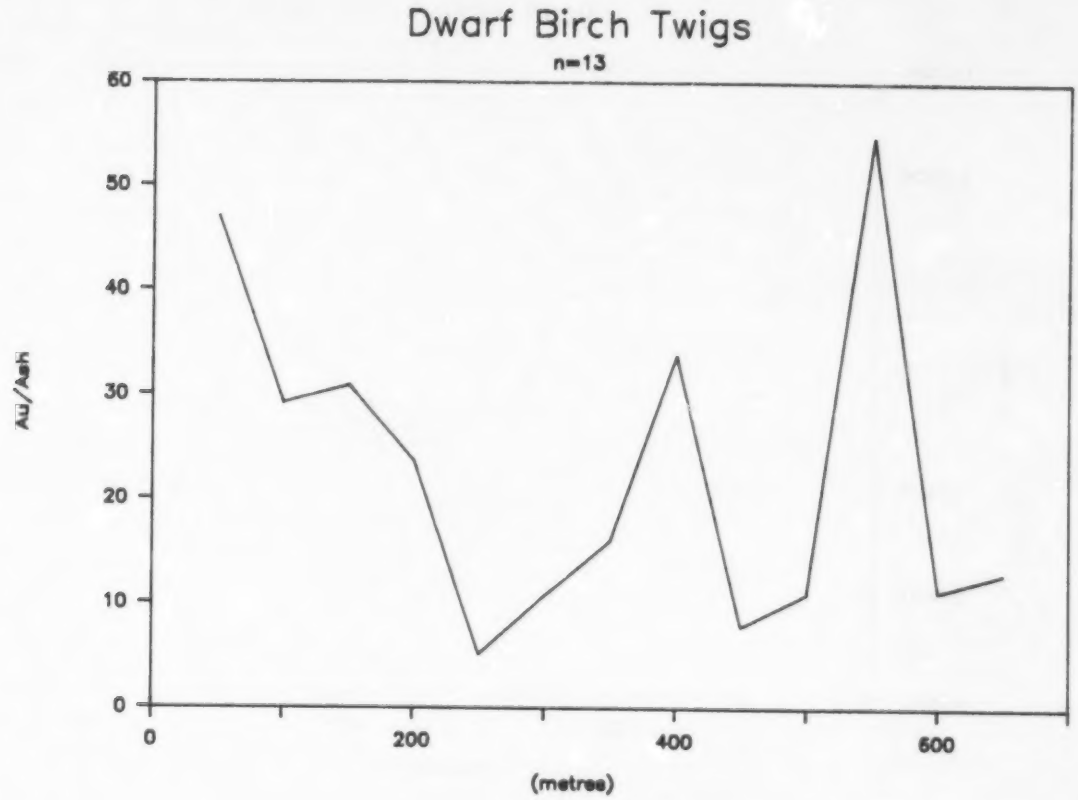

Dwarf Birch Twigs
n=13
Pb/Ash
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
0
200
400
600
(metres)

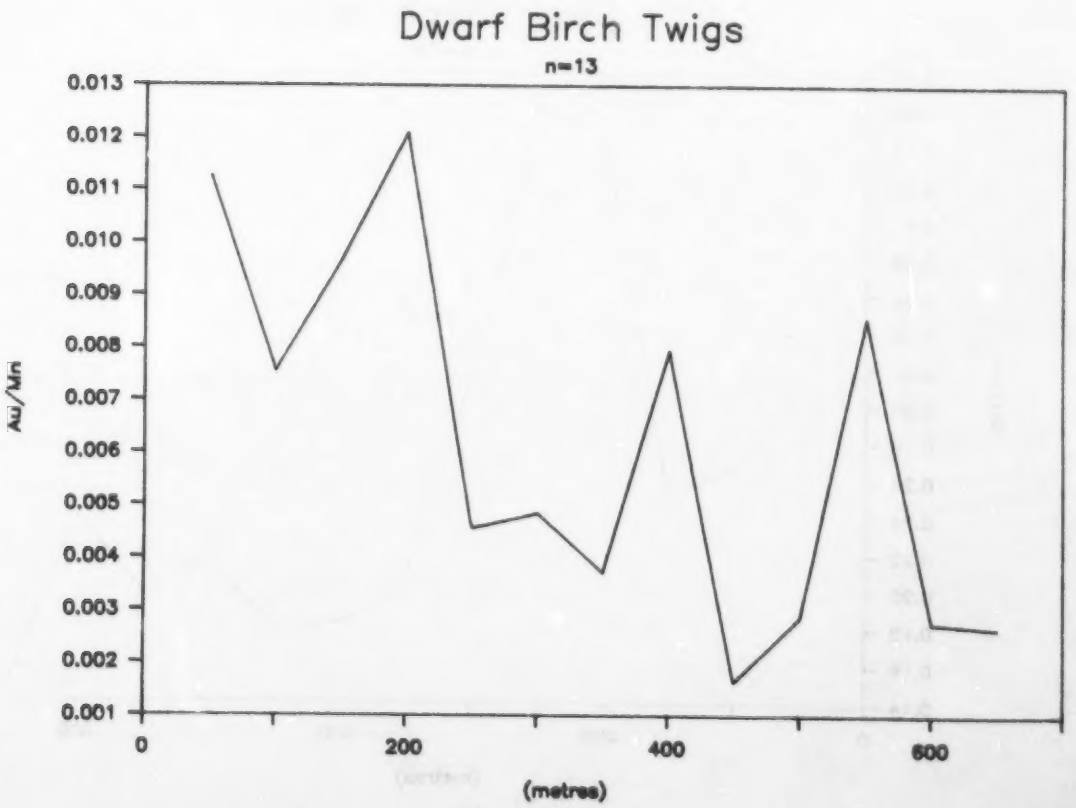

Dwarf Birch Twigs
n=13
As/Ash
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0
200
400
600
(metres)

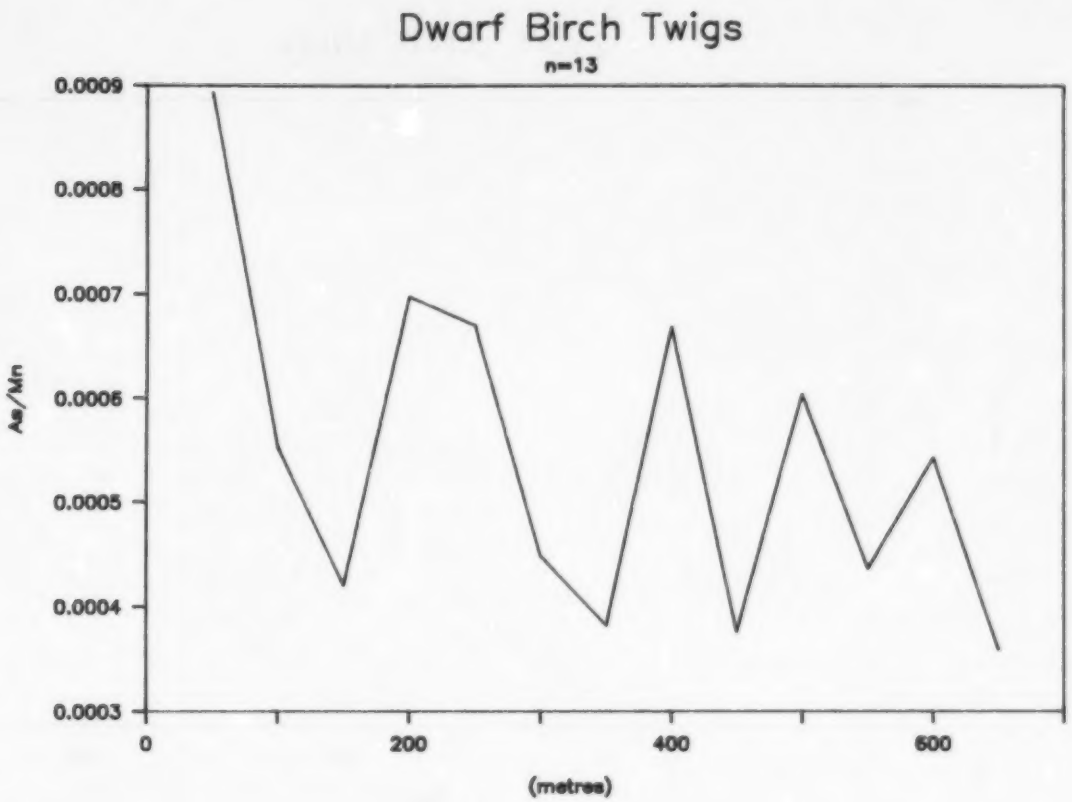

Dwarf Birch Twigs
n=13
Ba/Ash
(Thousands)
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0
200
400
600
(metres)

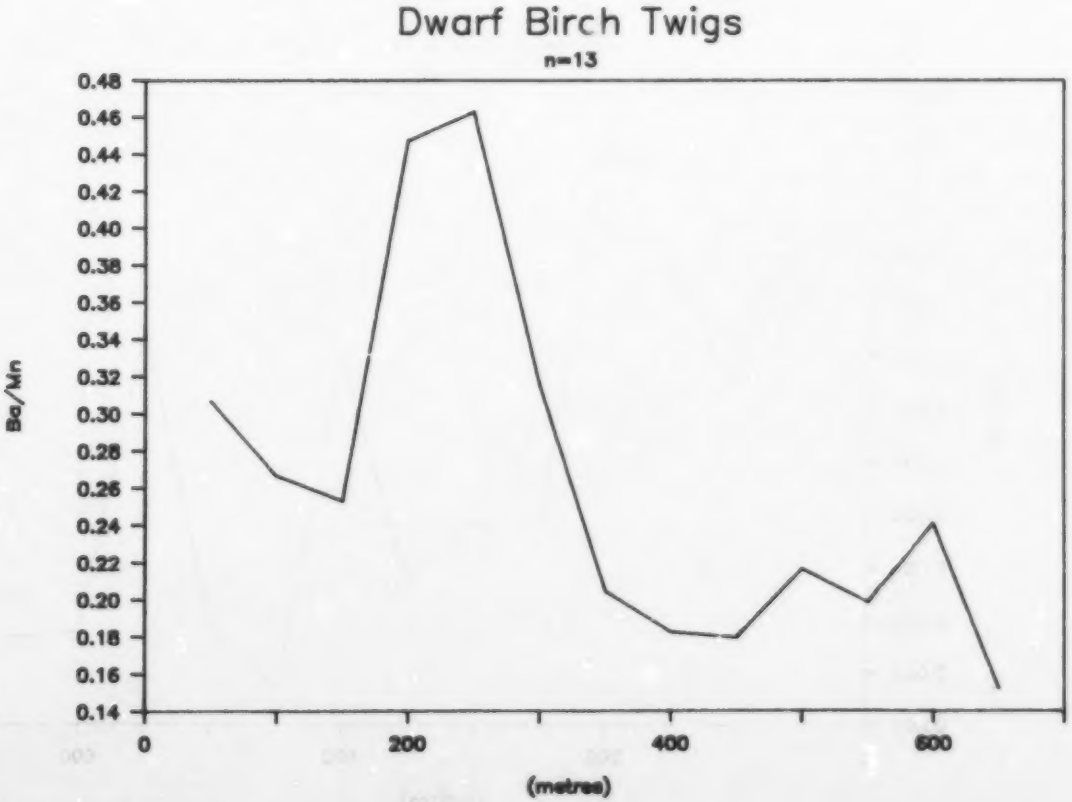

Dwarf Birch Twigs
n=13
1.90
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
0.90
0.80
Zn/Mn
0
200
400
600
(metres)

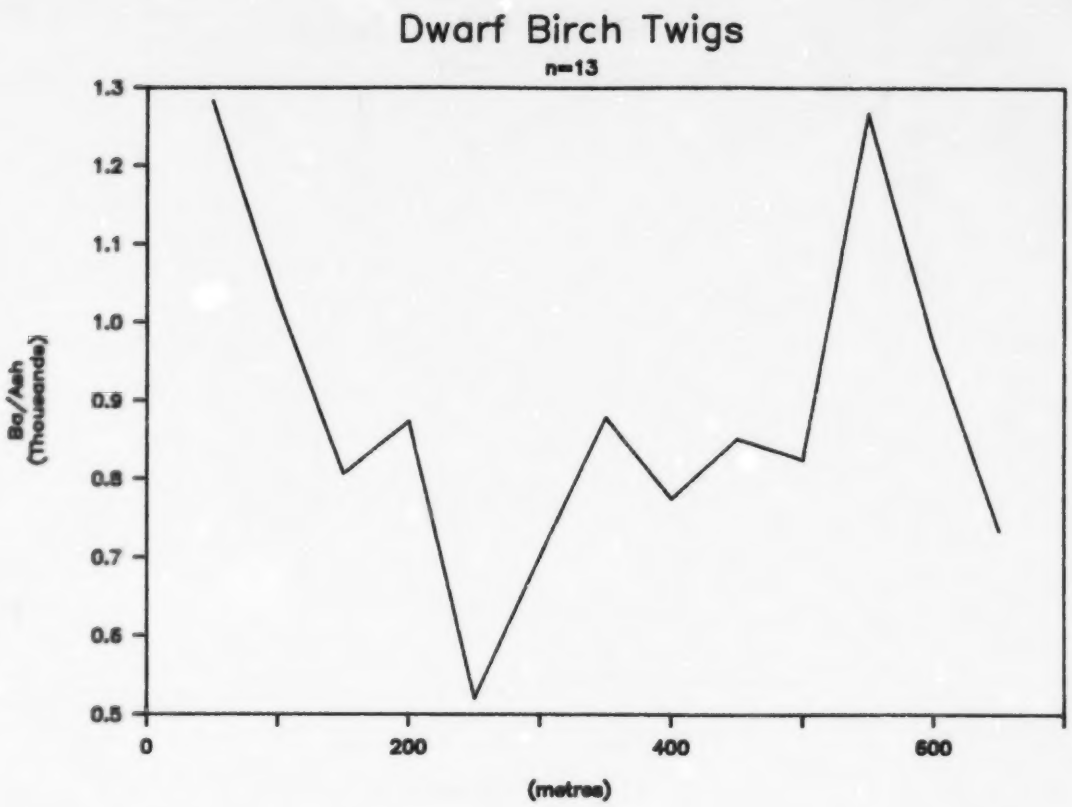

Dwarf Birch Twigs
n=13
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
Pb/Mn
0
200
400
600
(metres)

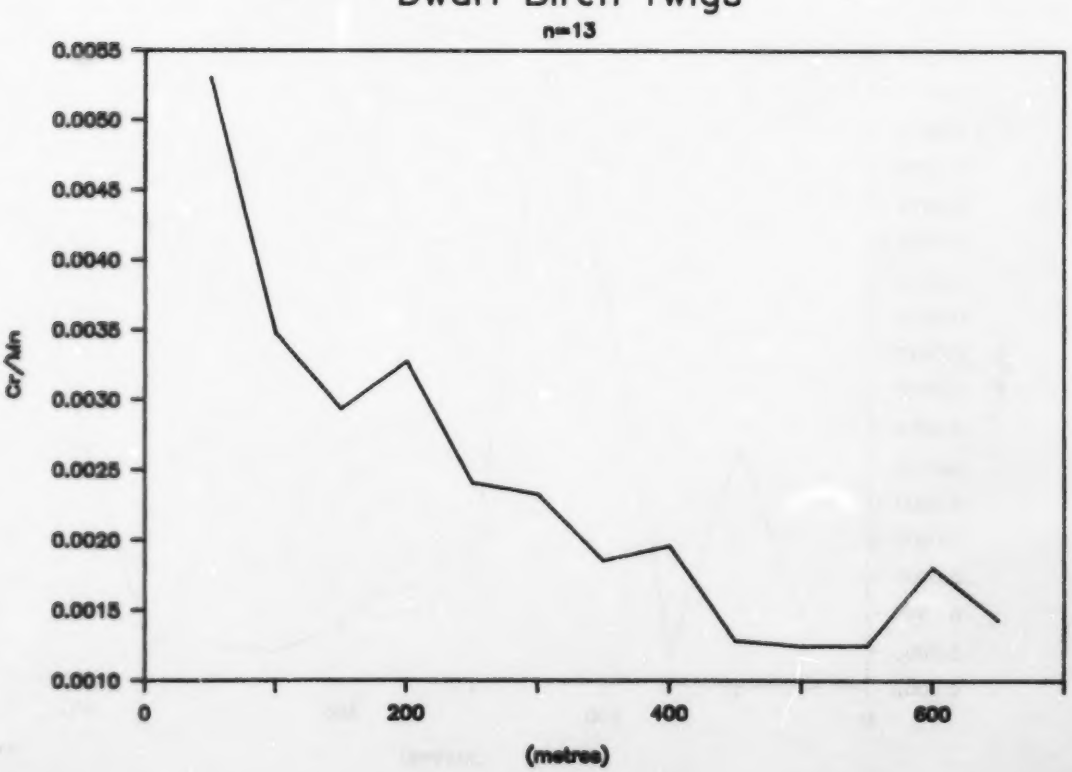

Dwarf Birch Twigs
n=13
Au/Ash
60
50
40
30
20
10
0
0
200
400
600
(metres)

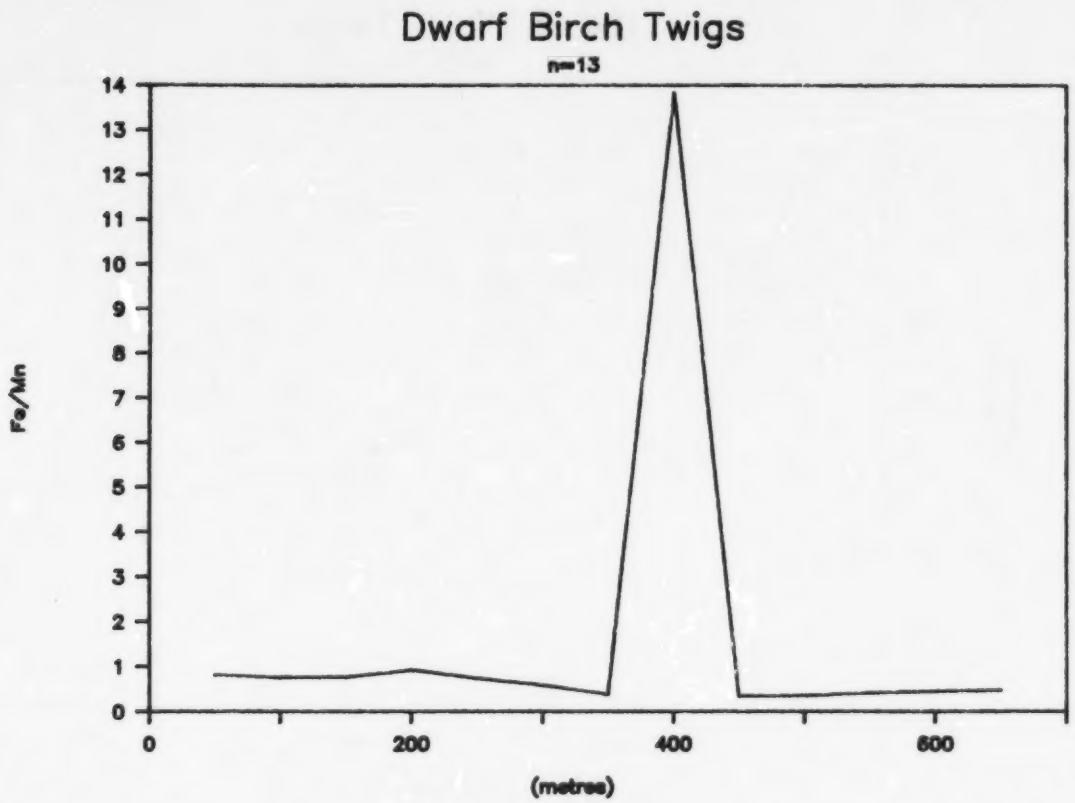

Dwarf Birch Twigs
n=13
Au/Mn
0.013
0.012
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
200
400
600
(metres)

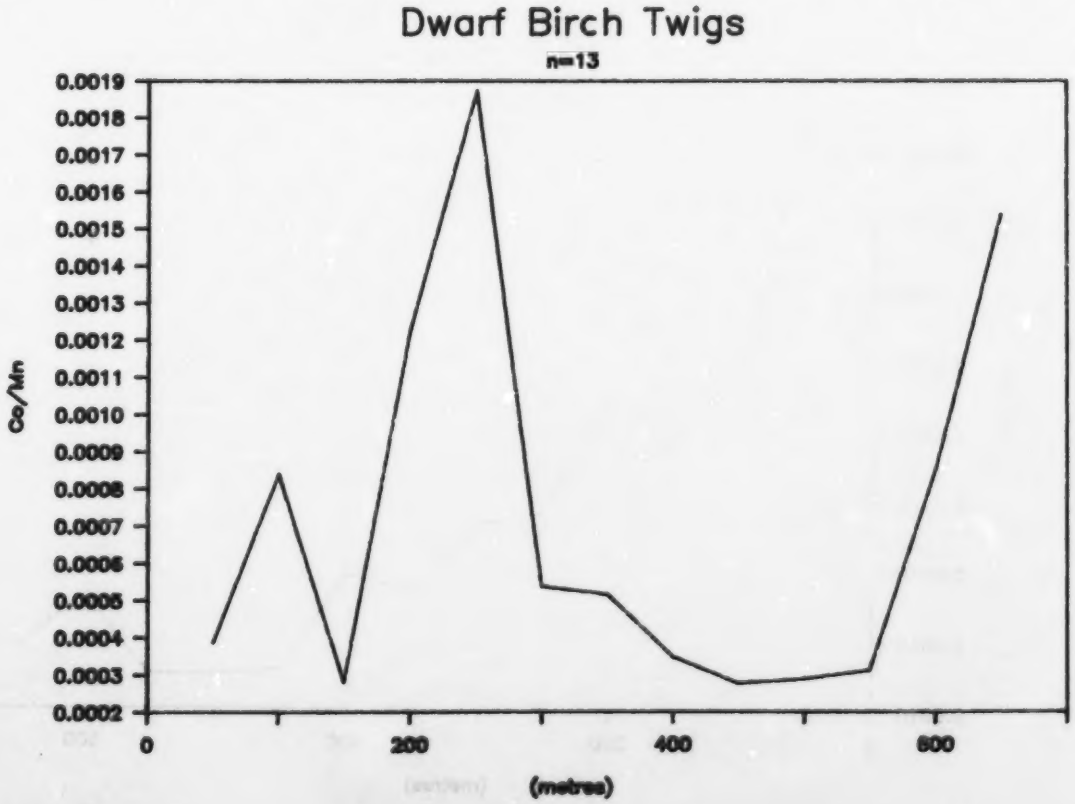

Dwarf Birch Twigs
n=13
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
As/Mn
0
200
400
600
(metres)

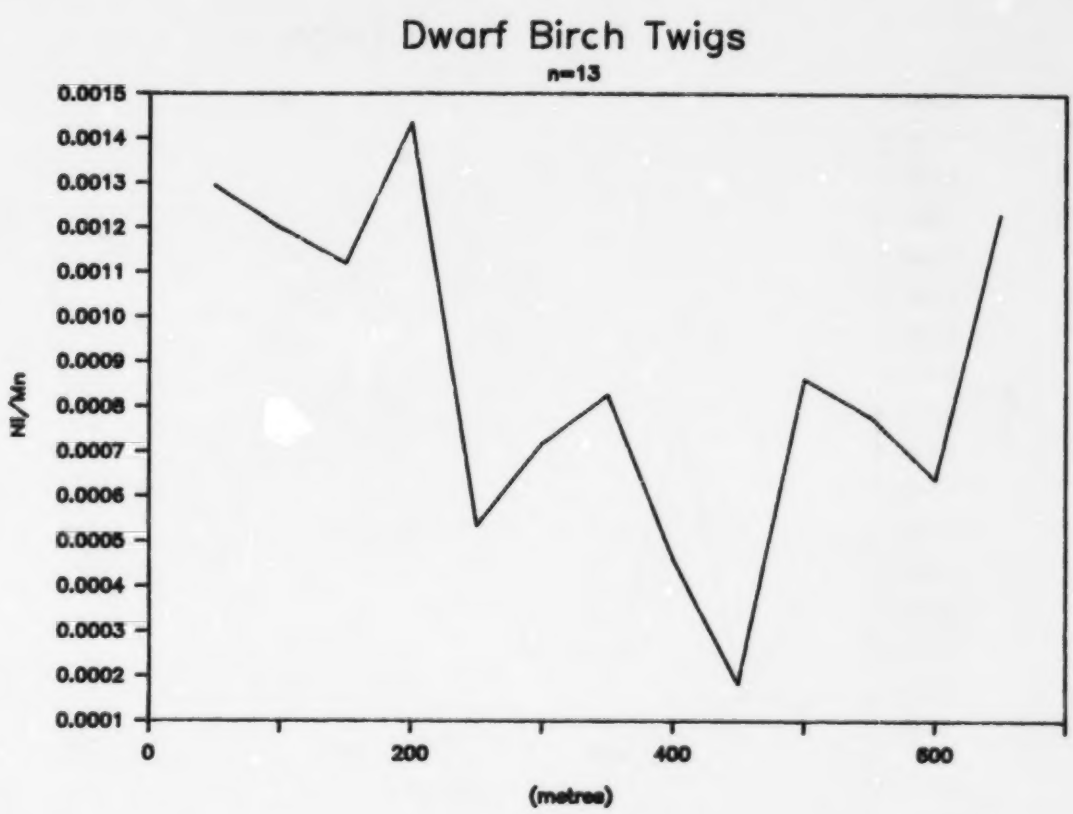

Dwarf Birch Twigs
n=13
0.48
0.46
0.44
0.42
0.40
0.38
0.36
0.34
0.32
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
Ba/Mn
0
200
400
600
(metres)

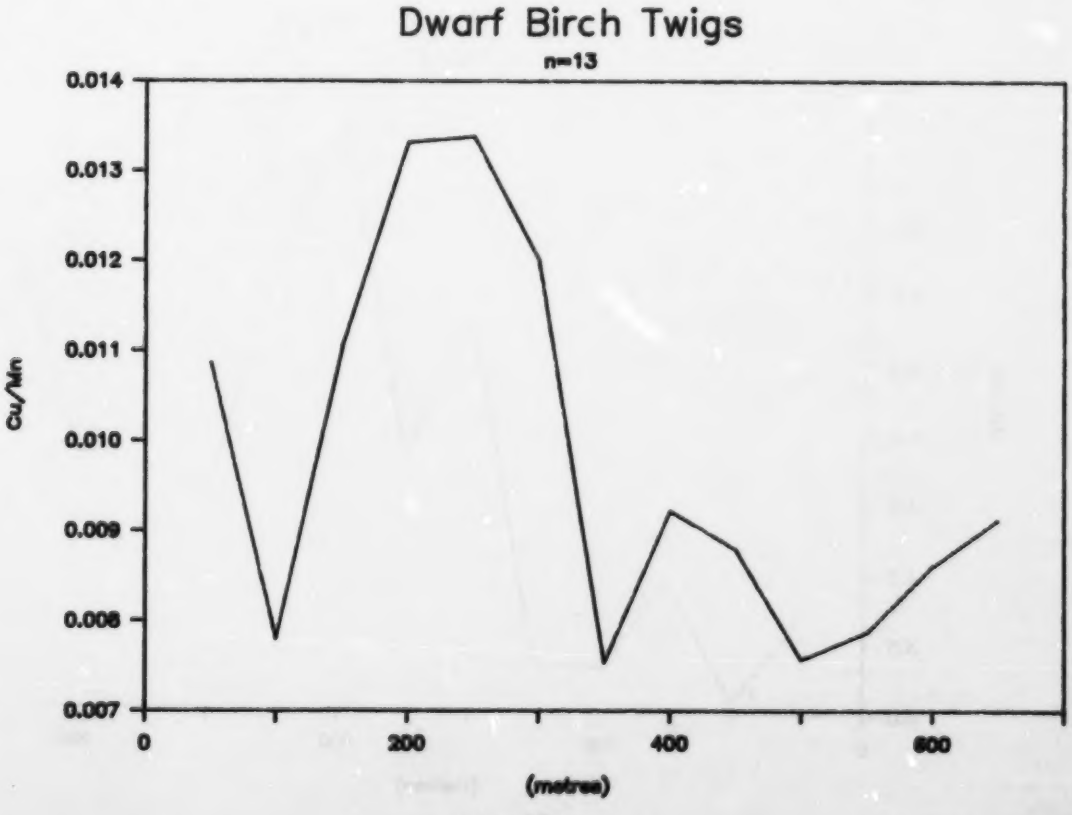

Dwarf Birch Twigs
n=13
Ba/Ash (Thousands)
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0
200
400
600
(metres)

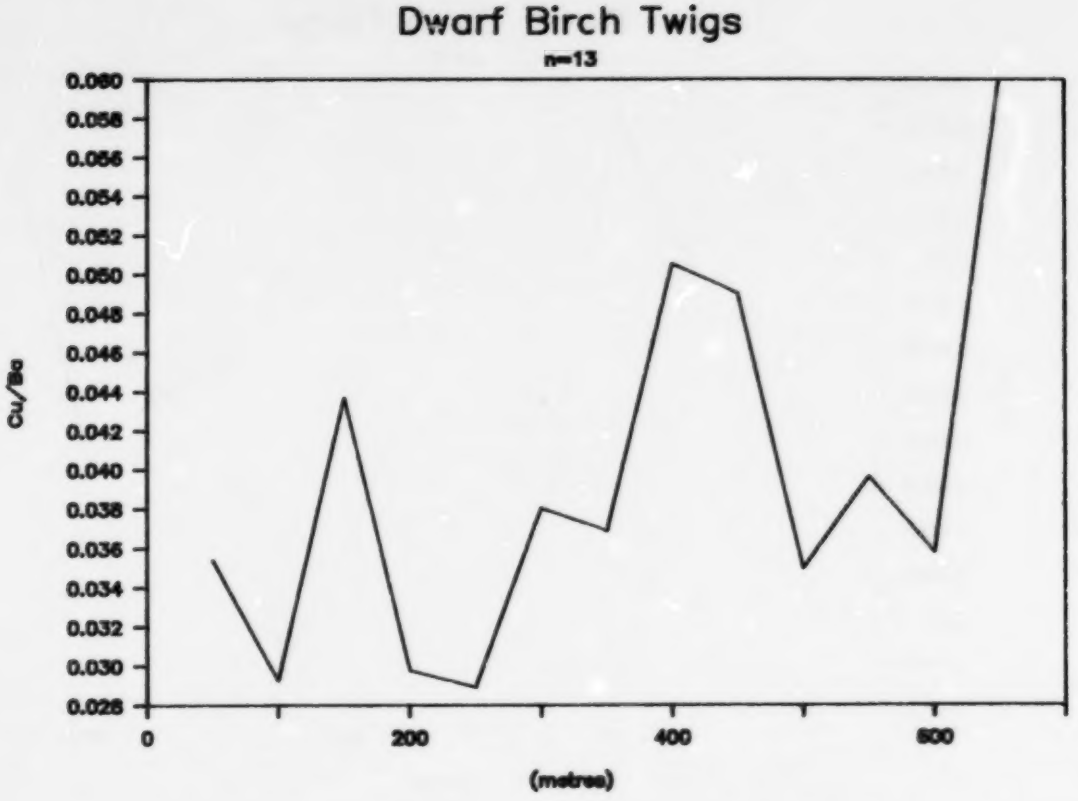

Dwarf Birch Twigs
n=13
Cr/Mn
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
0
200
400
600
(metres)

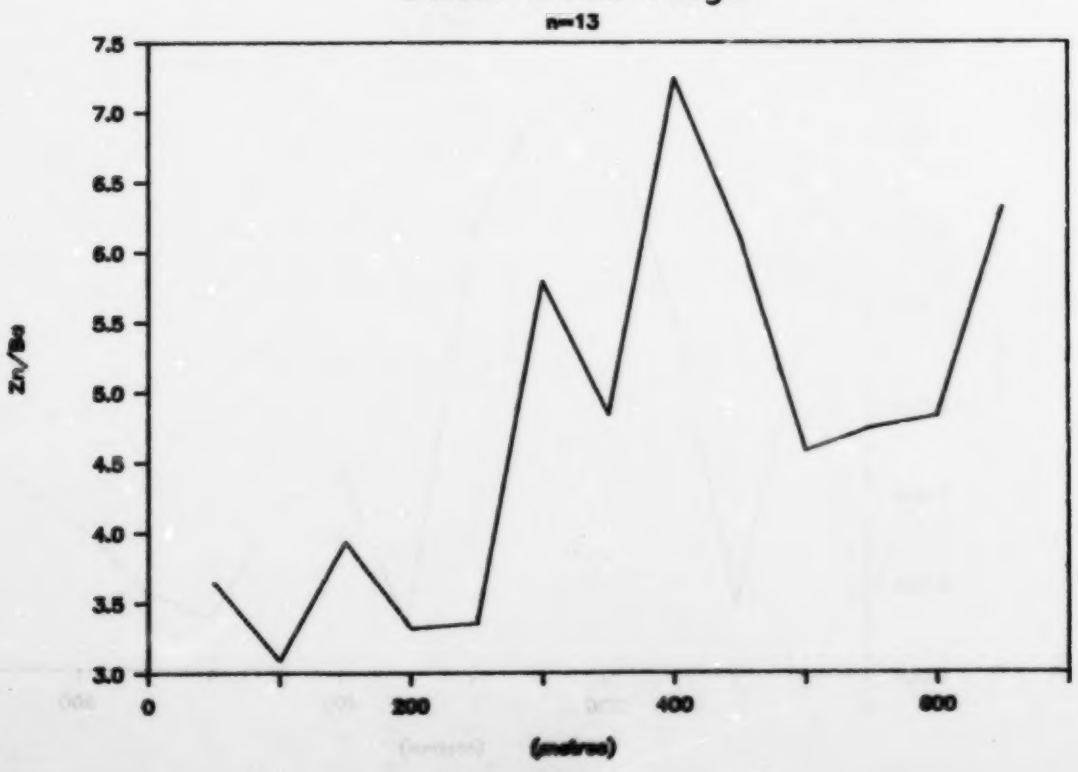

Dwarf Birch Twigs
n=13
Fe/Mn
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
200
400
600
(metres)

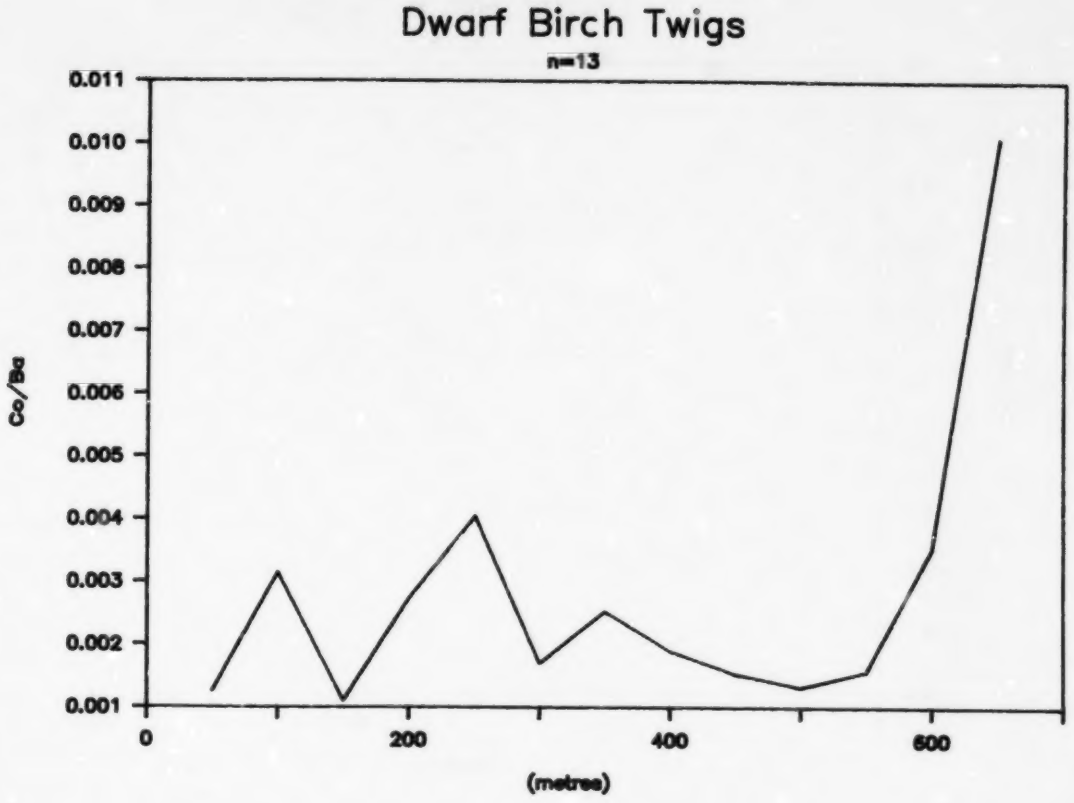

Dwarf Birch Twigs
n=13
Co/Mn
0.0019
0.0018
0.0017
0.0016
0.0015
0.0014
0.0013
0.0012
0.0011
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0
200
400
600
(metres)

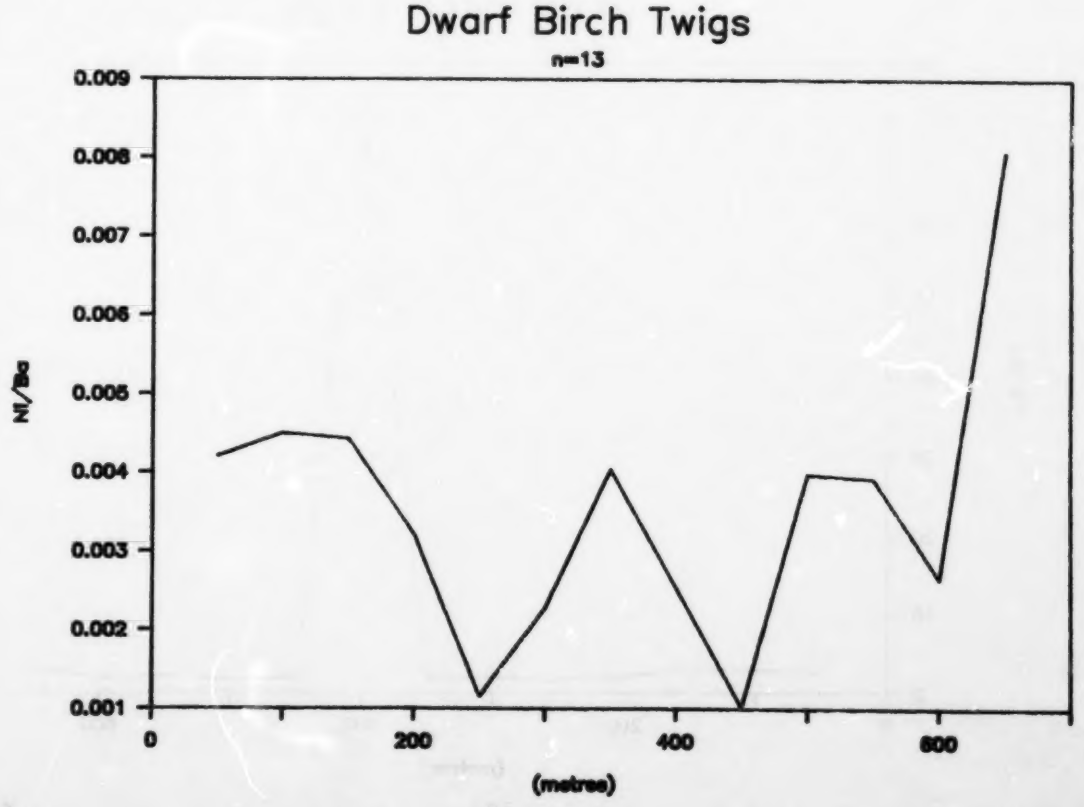

Dwarf Birch Twigs
n=13
Ni/Mn
0.0015
0.0014
0.0013
0.0012
0.0011
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
200
400
600
(metres)

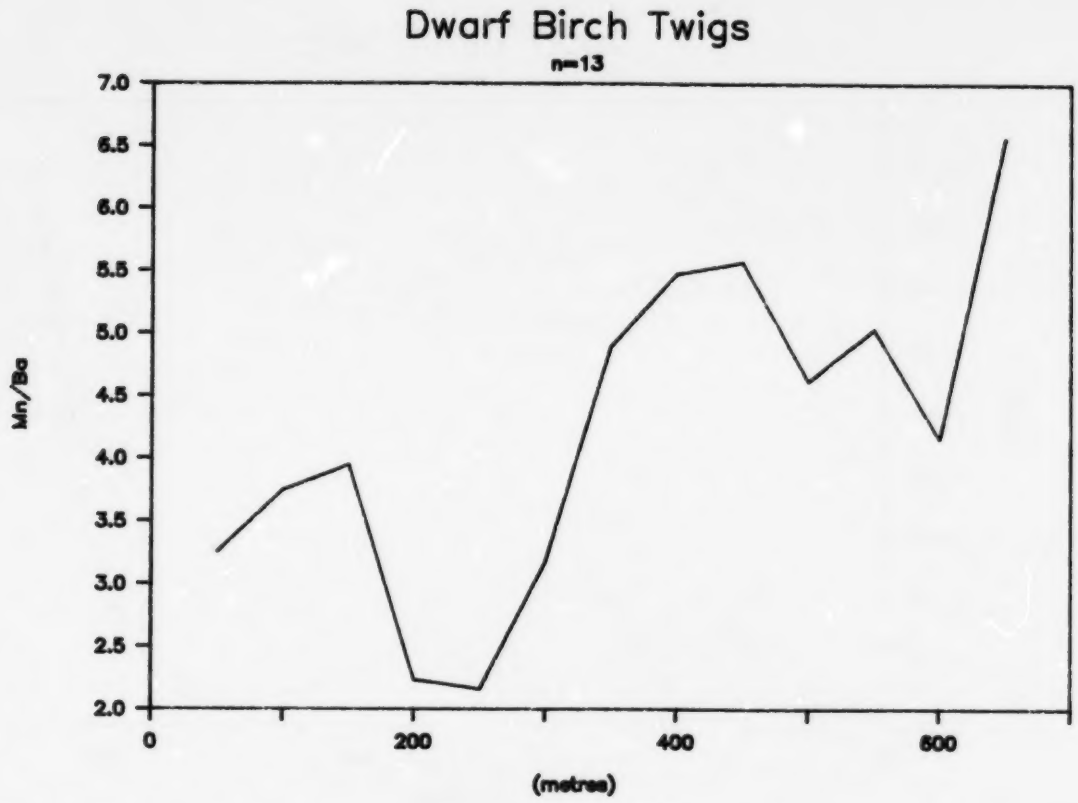

Dwarf Birch Twigs
n=13
Cu/Mn
0.014
0.013
0.012
0.011
0.010
0.009
0.008
0.007
0
200
400
600
(metres)

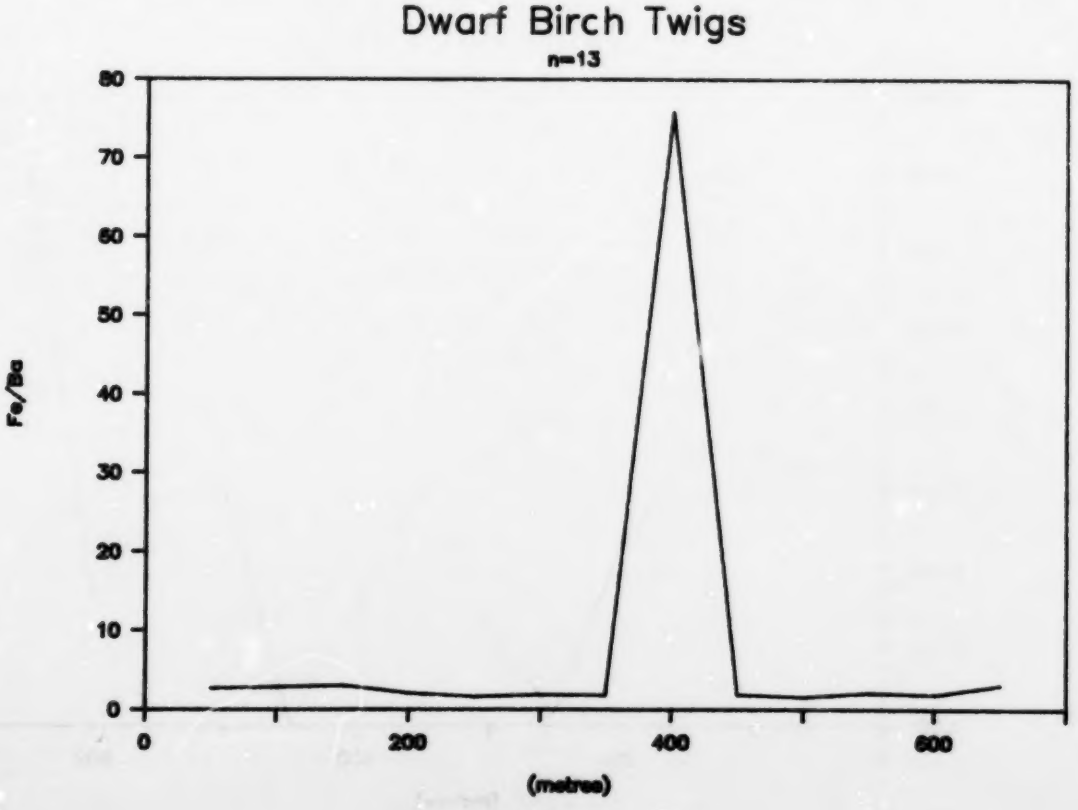

Dwarf Birch Twigs
n=13
Cu/Ba
0.060
0.058
0.056
0.054
0.052
0.050
0.048
0.046
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0
200
400
600
(metres)

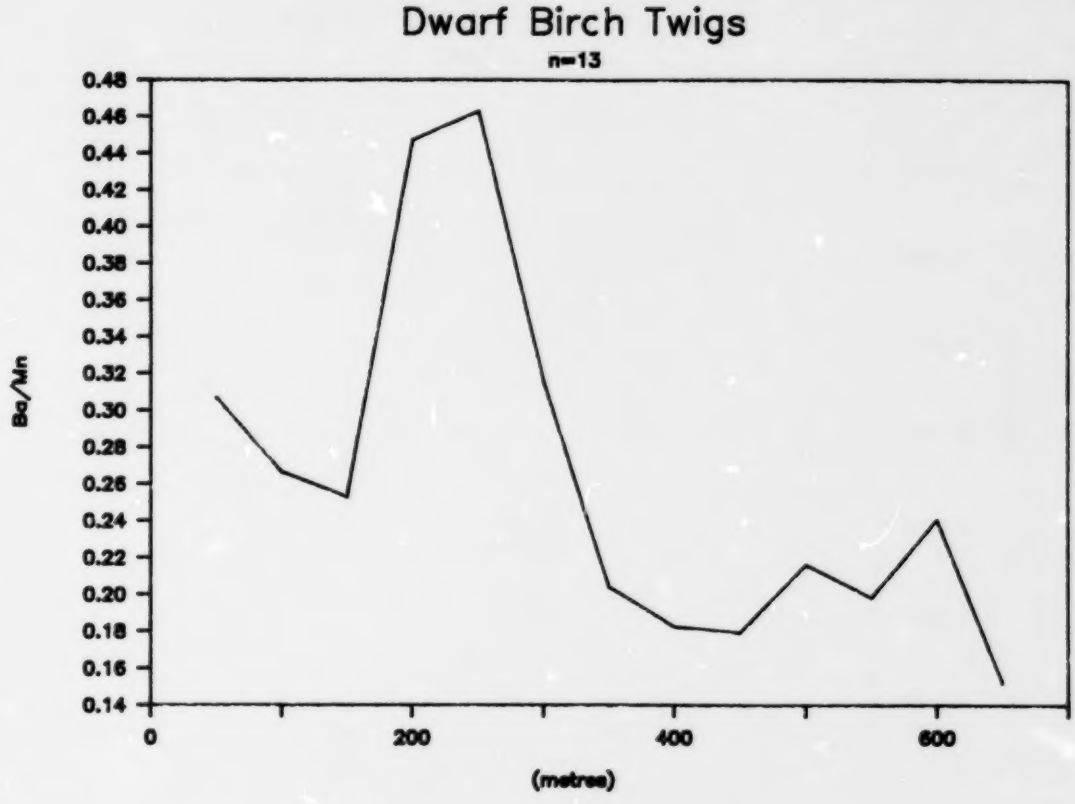

Dwarf Birch Twigs
n=13
Zn/Ba
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
0
200
400
600
(metres)

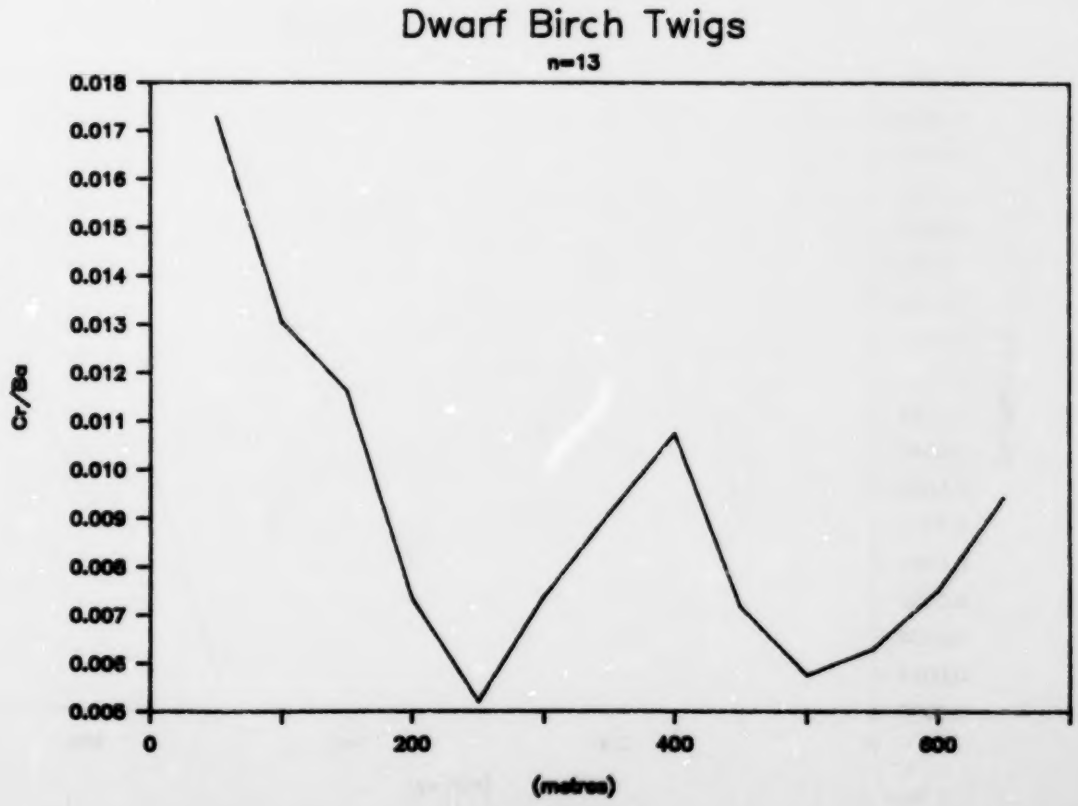

Dwarf Birch Twigs
n=13
Co/Ba
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
200
400
600
(metres)

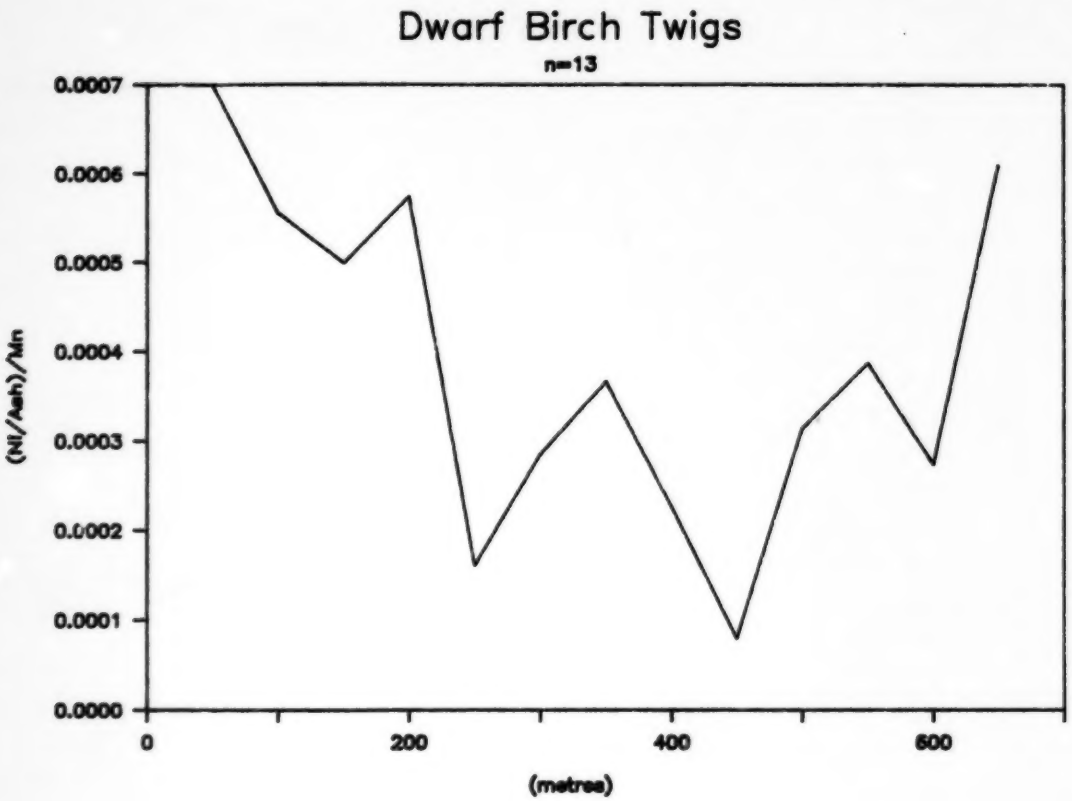

Dwarf Birch Twigs
n=13
Ni/Ba
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
200
400
600
(metres)

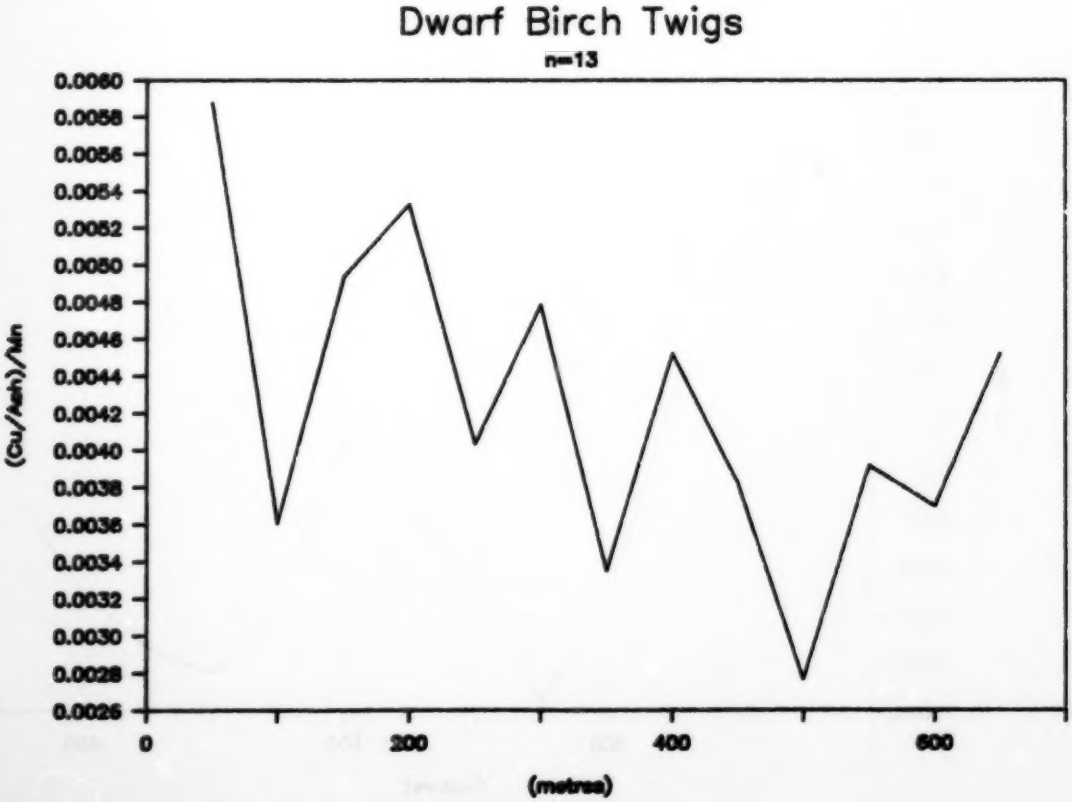

Dwarf Birch Twigs
n=13
Mn/Ba
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
0
200
400
600
(metres)

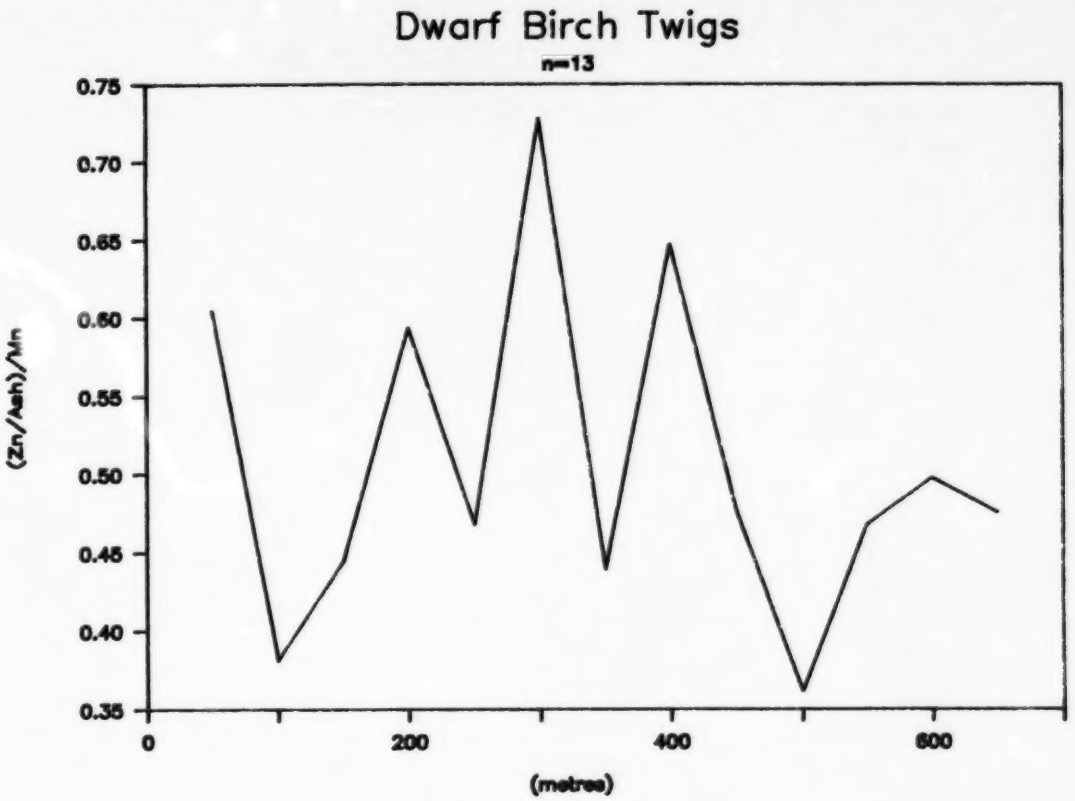

Dwarf Birch Twigs
n=13
Fe/Ba
80
70
60
50
40
30
20
10
0
0
200
400
600
(metres)

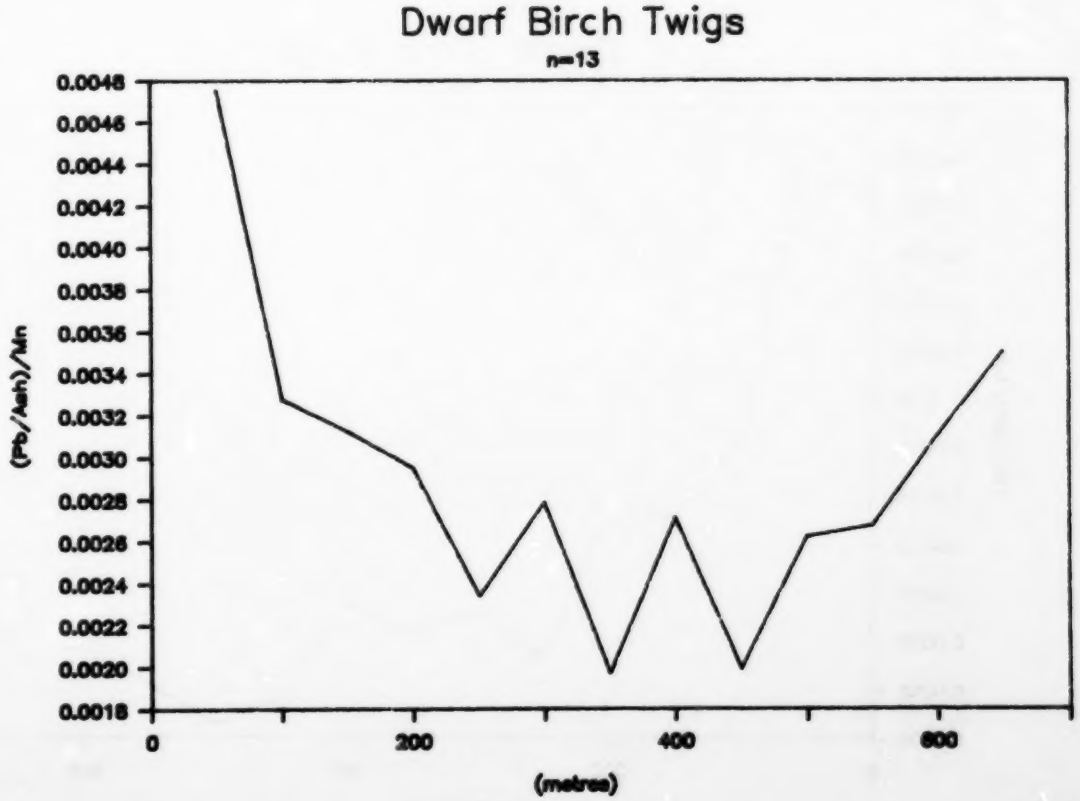

Dwarf Birch Twigs
n=13
Ba/Mn
0.48
0.46
0.44
0.42
0.40
0.38
0.36
0.34
0.32
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0
200
400
600
(metres)

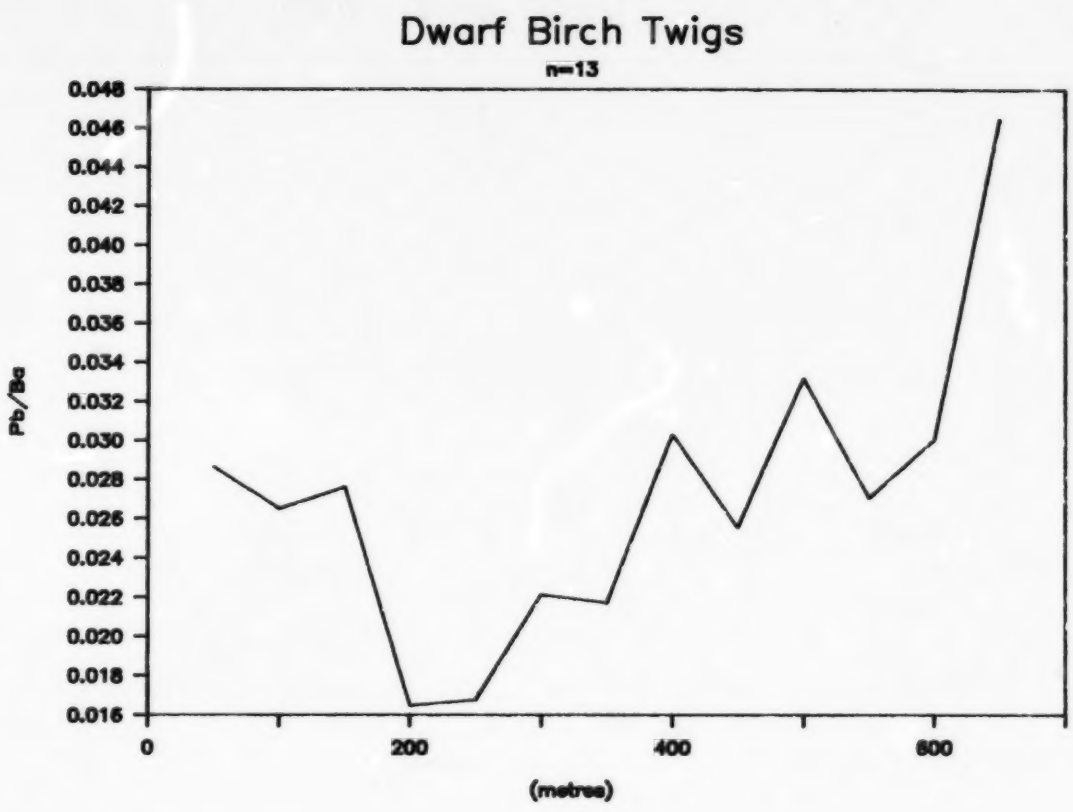

Dwarf Birch Twigs
n=13
Cr/Ba
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0
200
400
600
(metres)

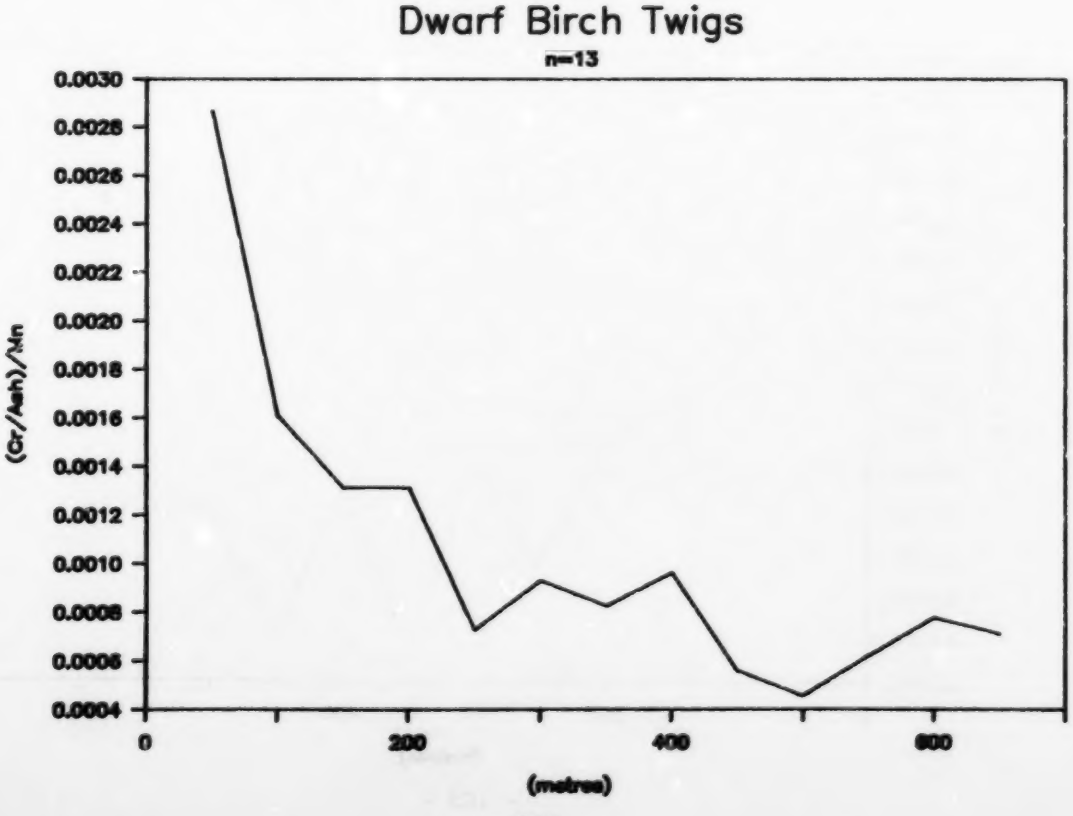

Dwarf Birch Twigs
n=13
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
(Ni/Ash)/Mn
0
200
400
600
(metres)

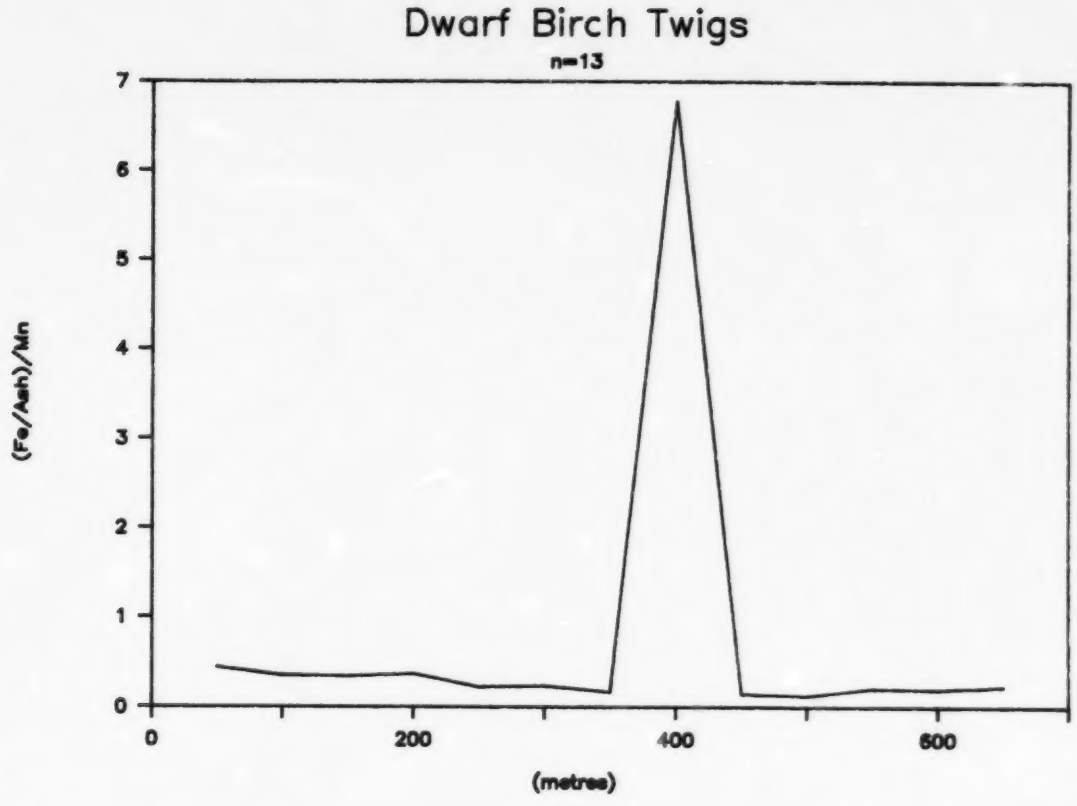

Dwarf Birch Twigs
n=13
0.0060
0.0058
0.0056
0.0054
0.0052
0.0050
0.0048
0.0046
0.0044
0.0042
0.0040
0.0038
0.0036
0.0034
0.0032
0.0030
0.0028
0.0026
(Cu/Ash)/Mn
0
200
400
600
(metres)

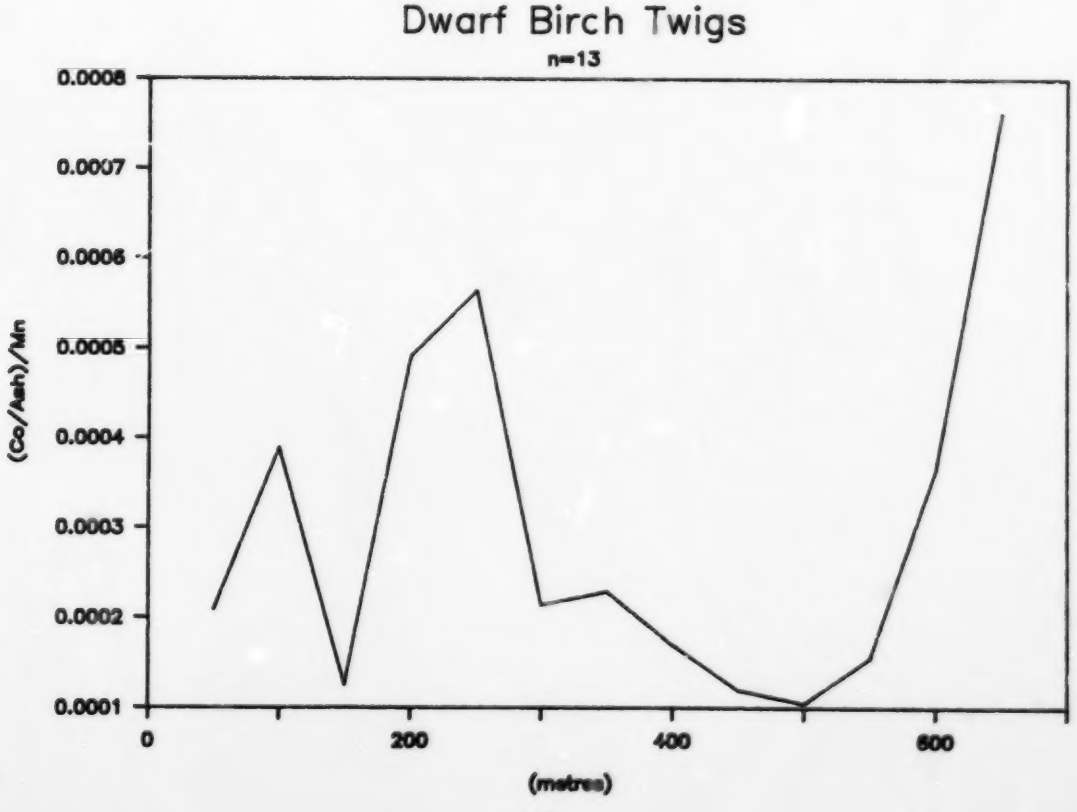

Dwarf Birch Twigs
n=13
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
(Zn/Ash)/Mn
0
200
400
600
(metres)

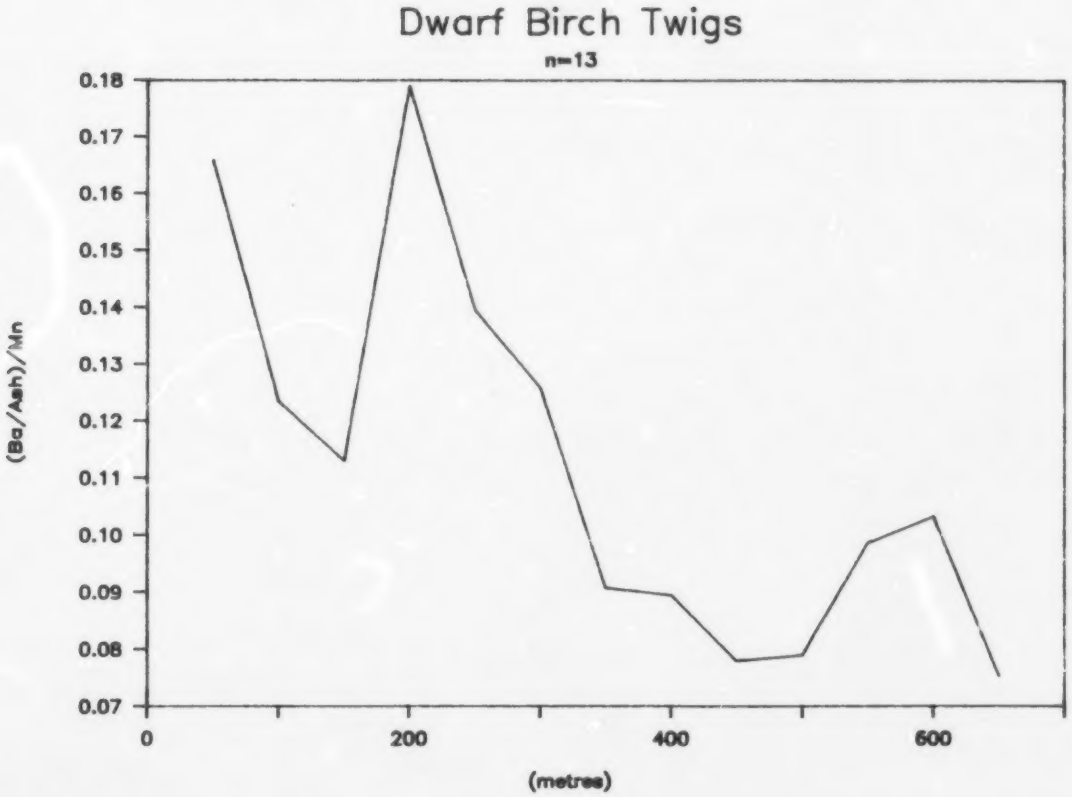

Dwarf Birch Twigs
n=13
0.0048
0.0046
0.0044
0.0042
0.0040
0.0038
0.0036
0.0034
0.0032
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
0.0018
(Pb/Ash)/Mn
0
200
400
600
(metres)

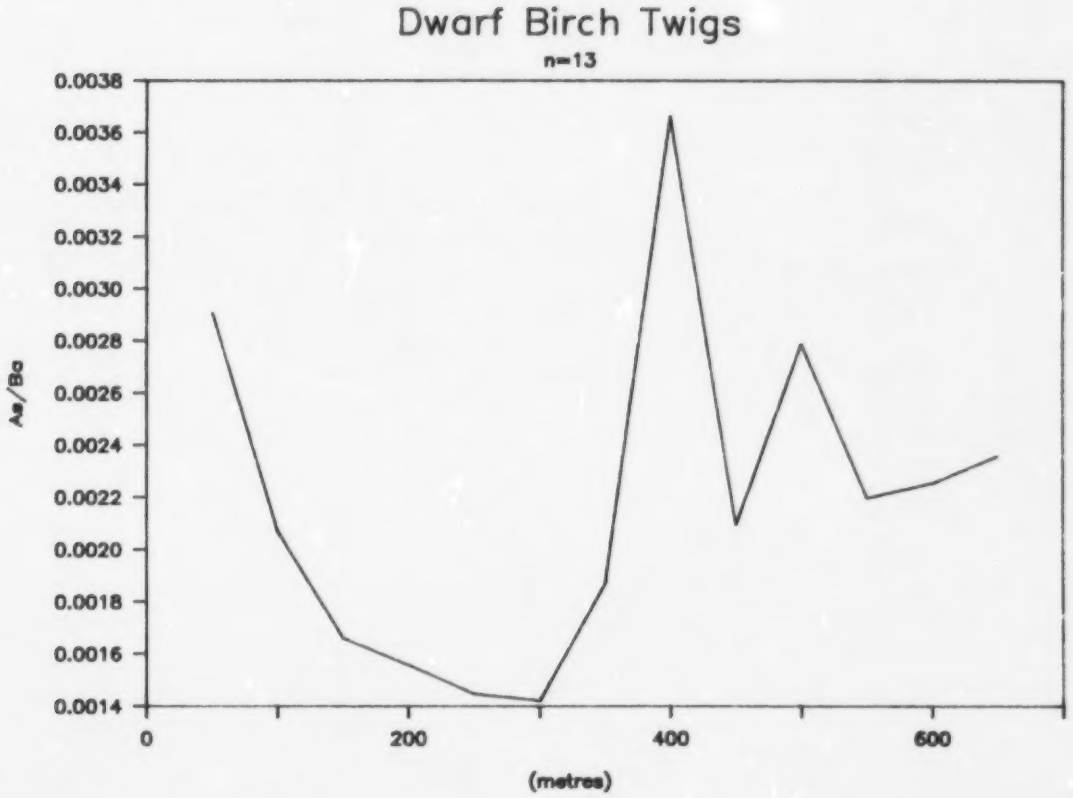

Dwarf Birch Twigs
n=13
Pb/Ba
0.048
0.046
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0
200
400
600
(metres)

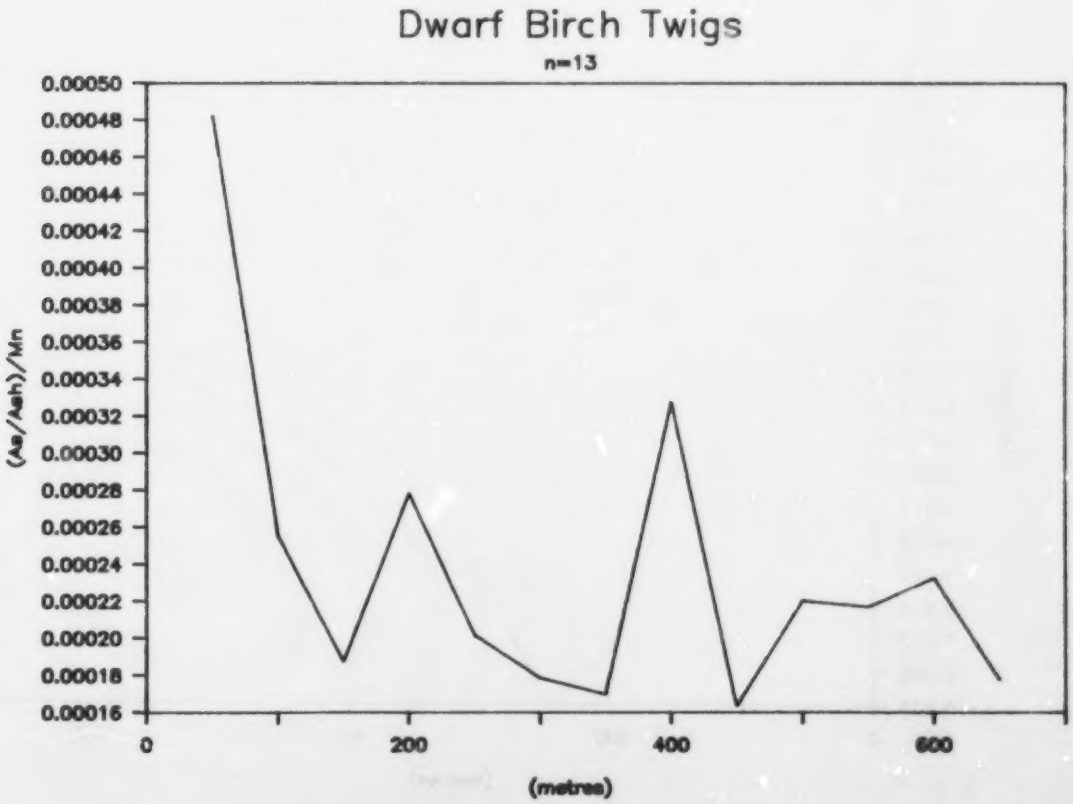

Dwarf Birch Twigs
n=13
(Cr/Ash)/Mn
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0
200
400
600
(metres)

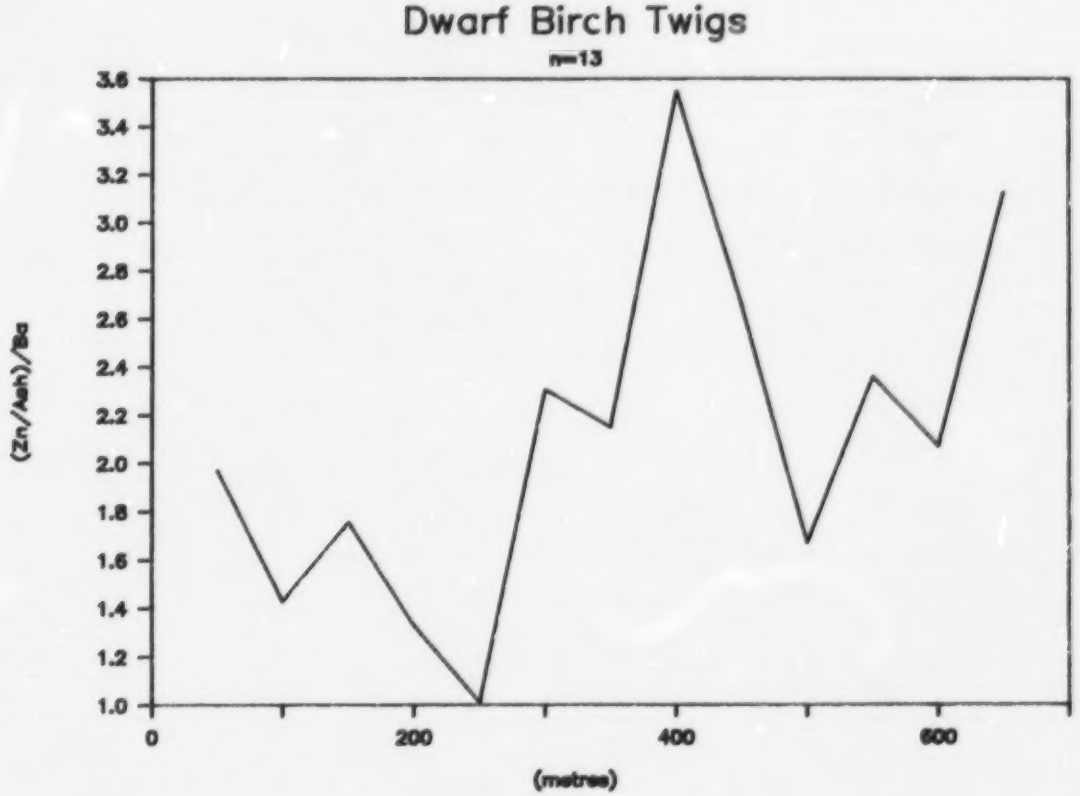

Dwarf Birch Twigs
n=13
(Fe/Ash)/Mn
0
1
2
3
4
5
6
7
0
200
400
600
(metres)

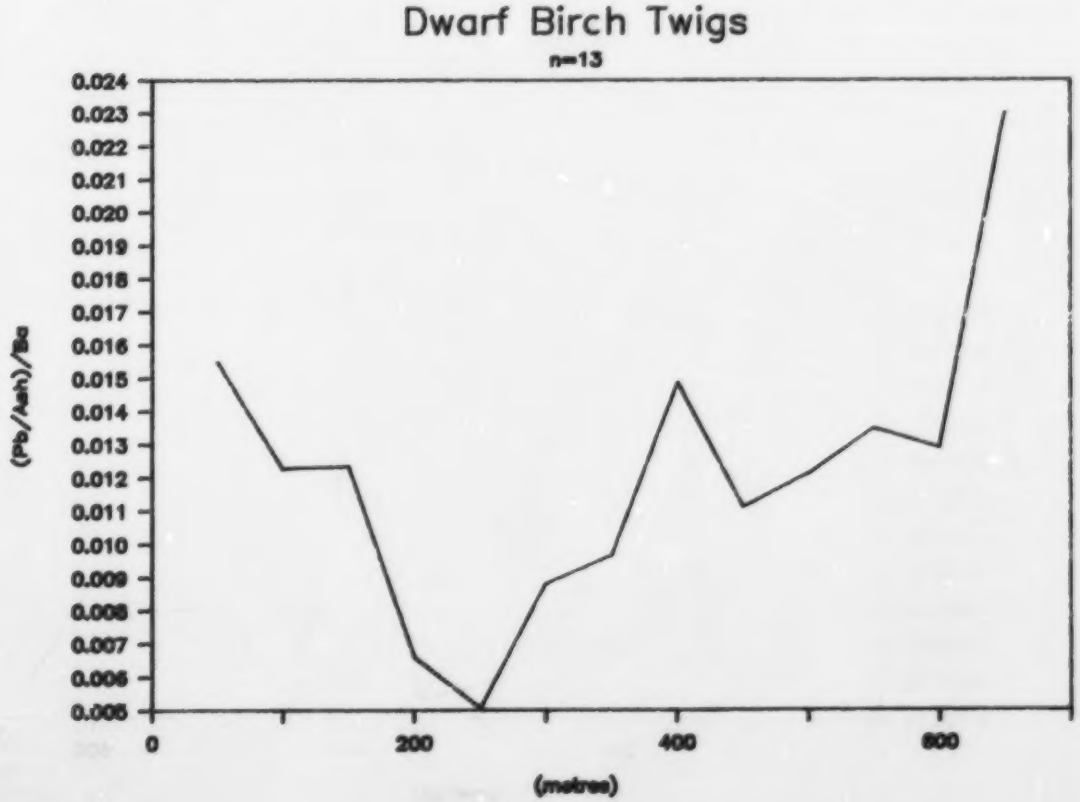

Dwarf Birch Twigs
n=13
(Co/Ash)/Mn
0.0001
0.0002
0.0003
0.0004
0.0005
0.0006
0.0007
0.0008
0
200
400
600
(metres)

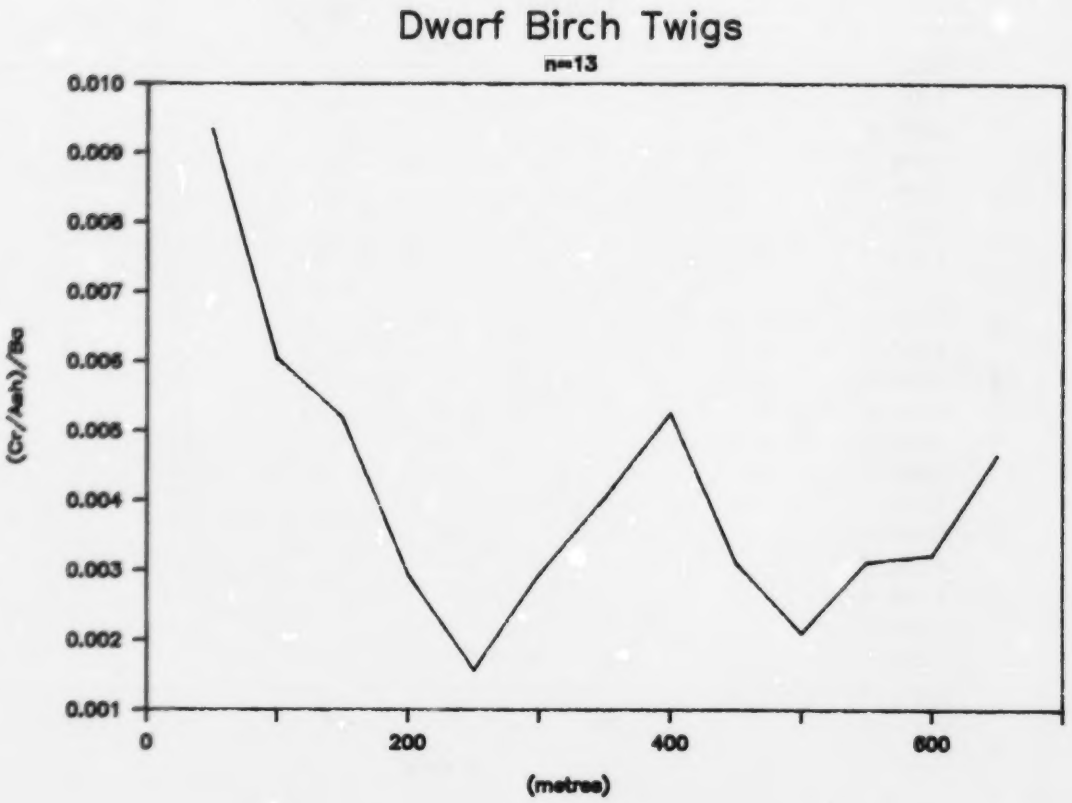

Dwarf Birch Twigs
n=13
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
(Ba/Ash)/Mn
0
200
400
600
(metres)

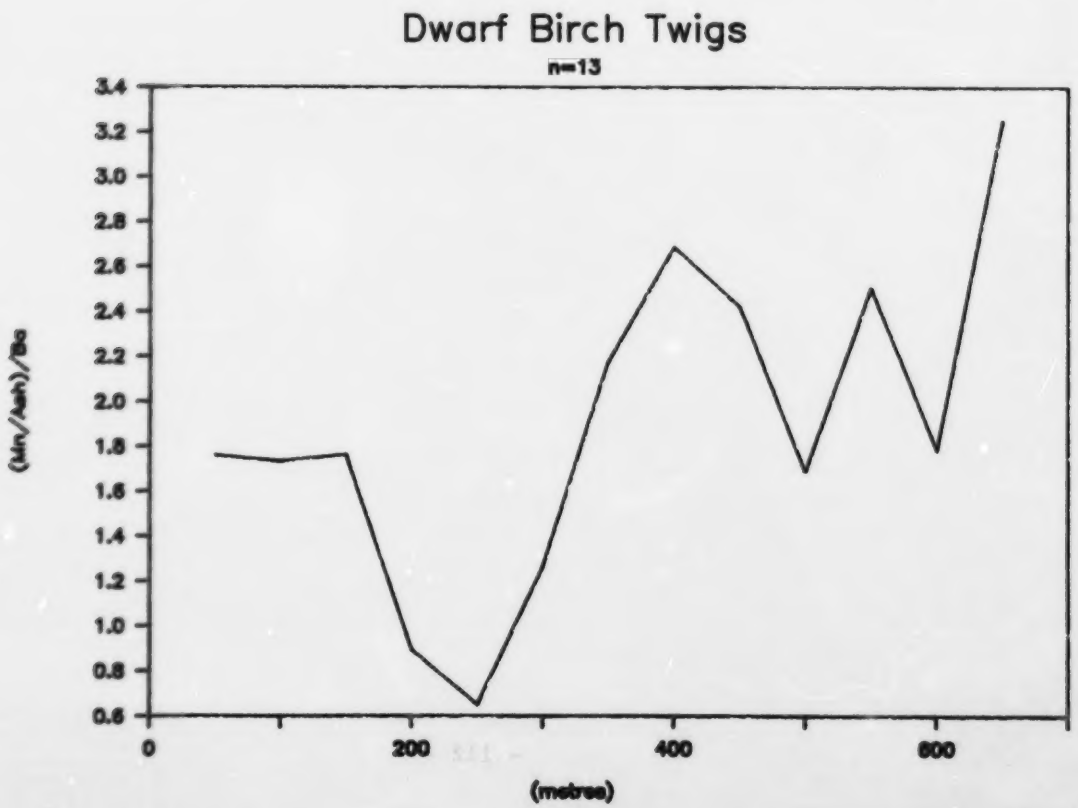

Dwarf Birch Twigs
n=13
As/Ba
0.0038
0.0036
0.0034
0.0032
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
0.0018
0.0016
0.0014
0
200
400
600
(metres)

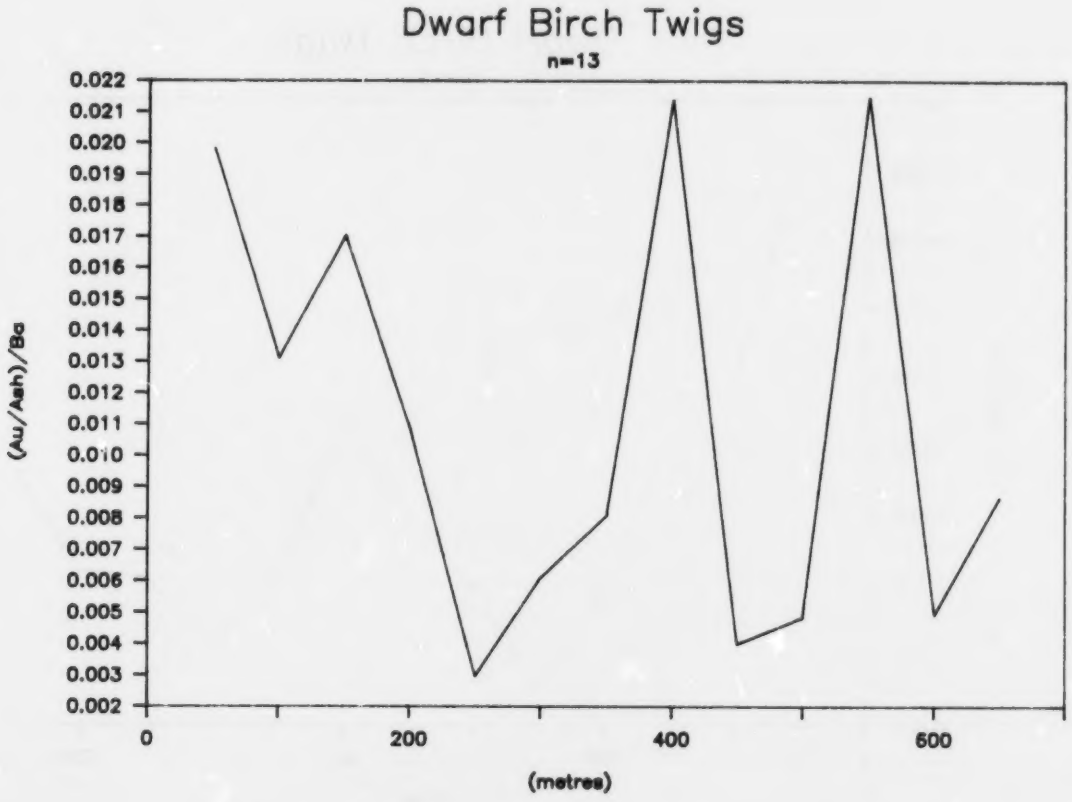

Dwarf Birch Twigs
n=13
(As/Ash)/Mn
0.00050
0.00048
0.00046
0.00044
0.00042
0.00040
0.00038
0.00036
0.00034
0.00032
0.00030
0.00028
0.00026
0.00024
0.00022
0.00020
0.00018
0.00016
0
200
400
600
(metres)

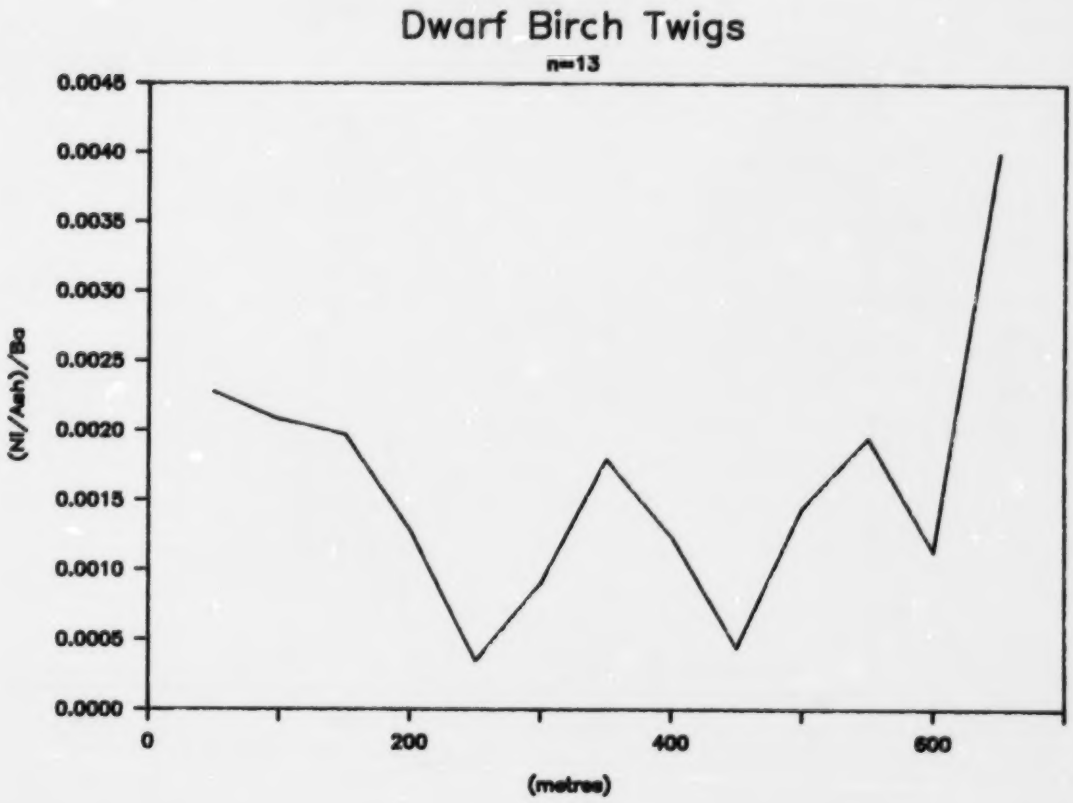

Dwarf Birch Twigs
n=13
(Zn/Ash)/Ba
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0
200
400
600
(metres)

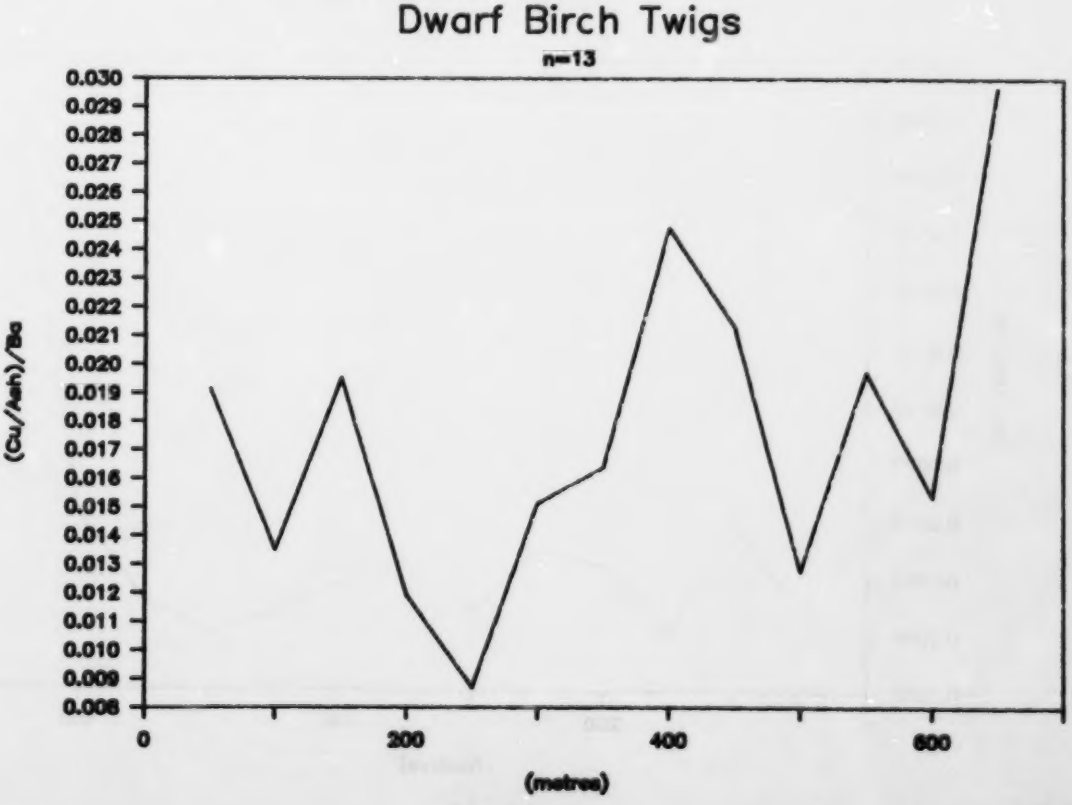

Dwarf Birch Twigs
n=13
(Pb/Ash)/Ba
0.024
0.023
0.022
0.021
0.020
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0
200
400
600
(metres)

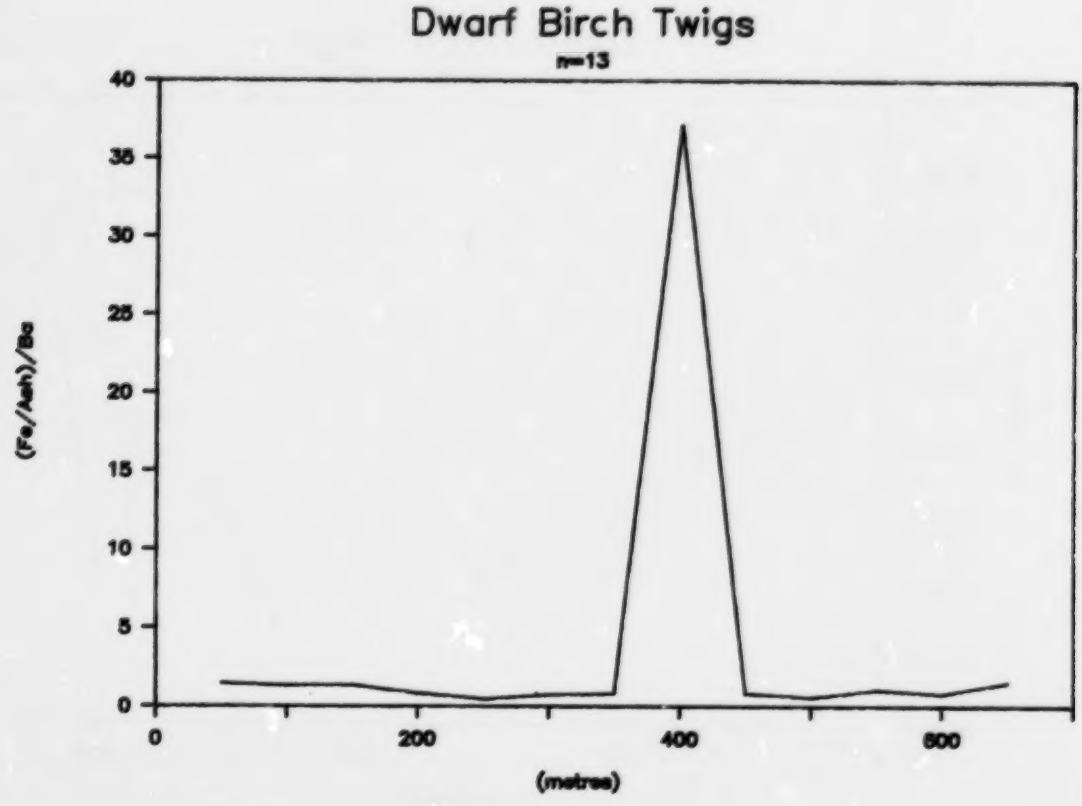

Dwarf Birch Twigs
n=13
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
(Cr/Ash)/Bo
0
200
400
600
(metres)

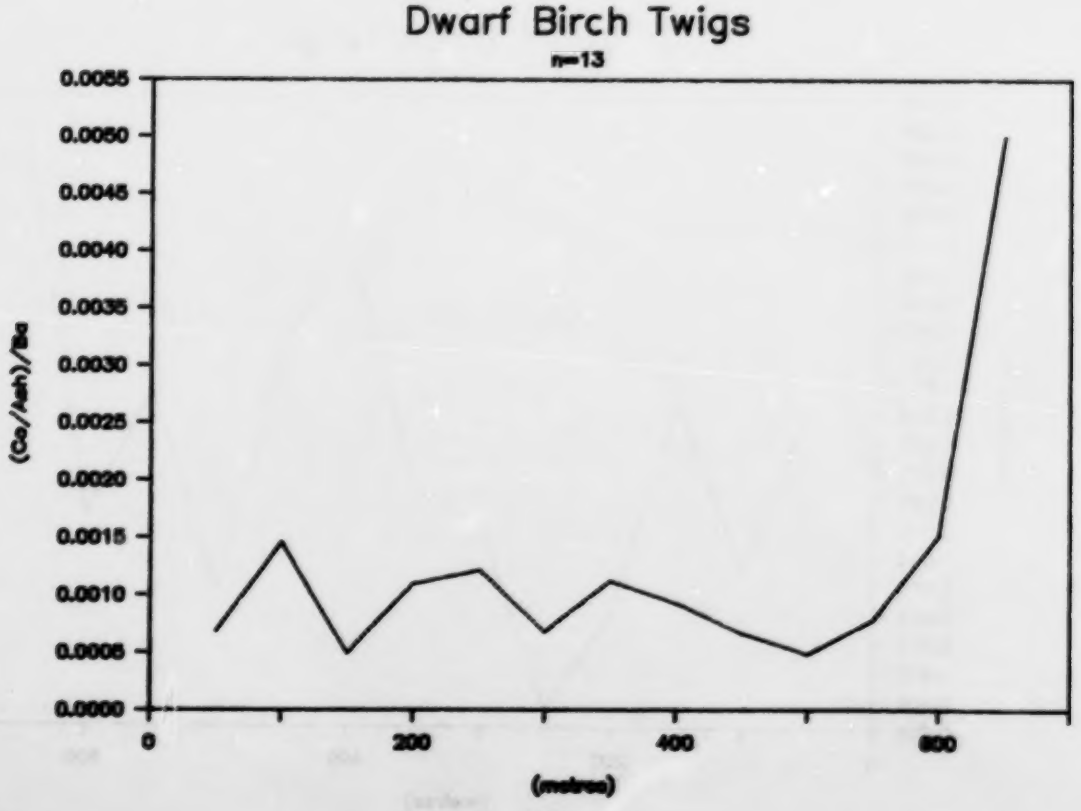

Dwarf Birch Twigs
n=13
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
(Mn/Ash)/Bo
0
200
400
600
(metres)

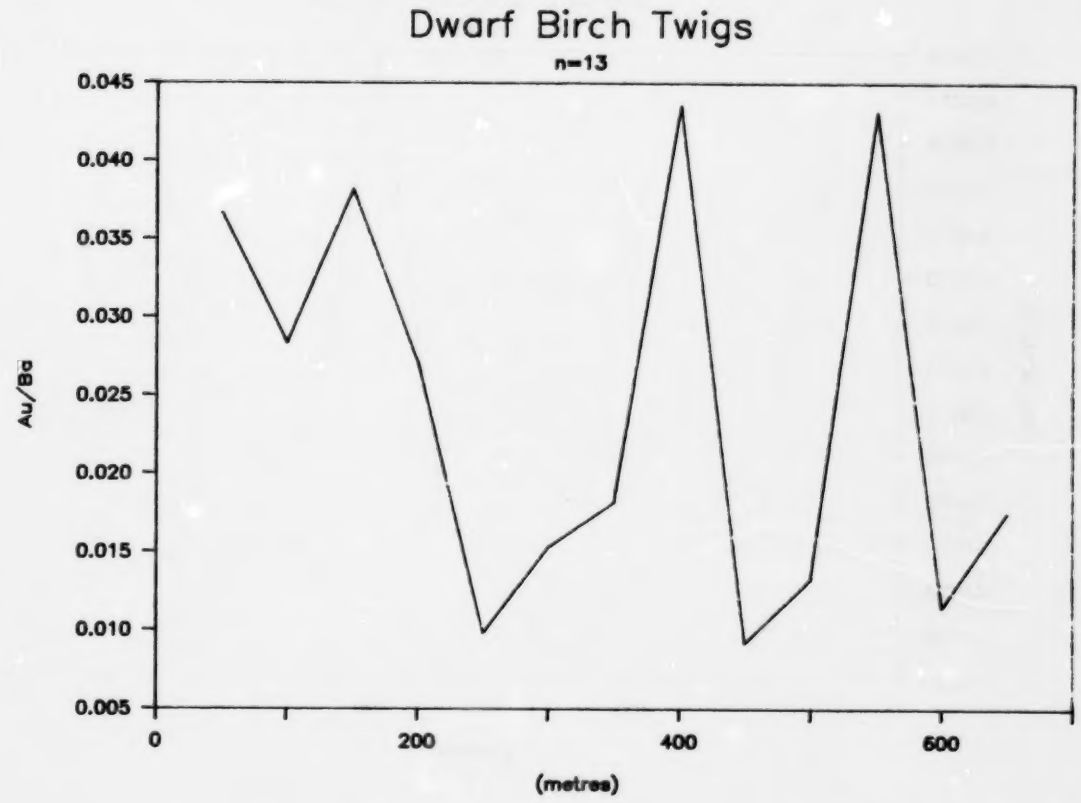

Dwarf Birch Twigs
n=13
(Au/Ash)/Ba
0.022
0.021
0.020
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0
200
400
600
(metres)

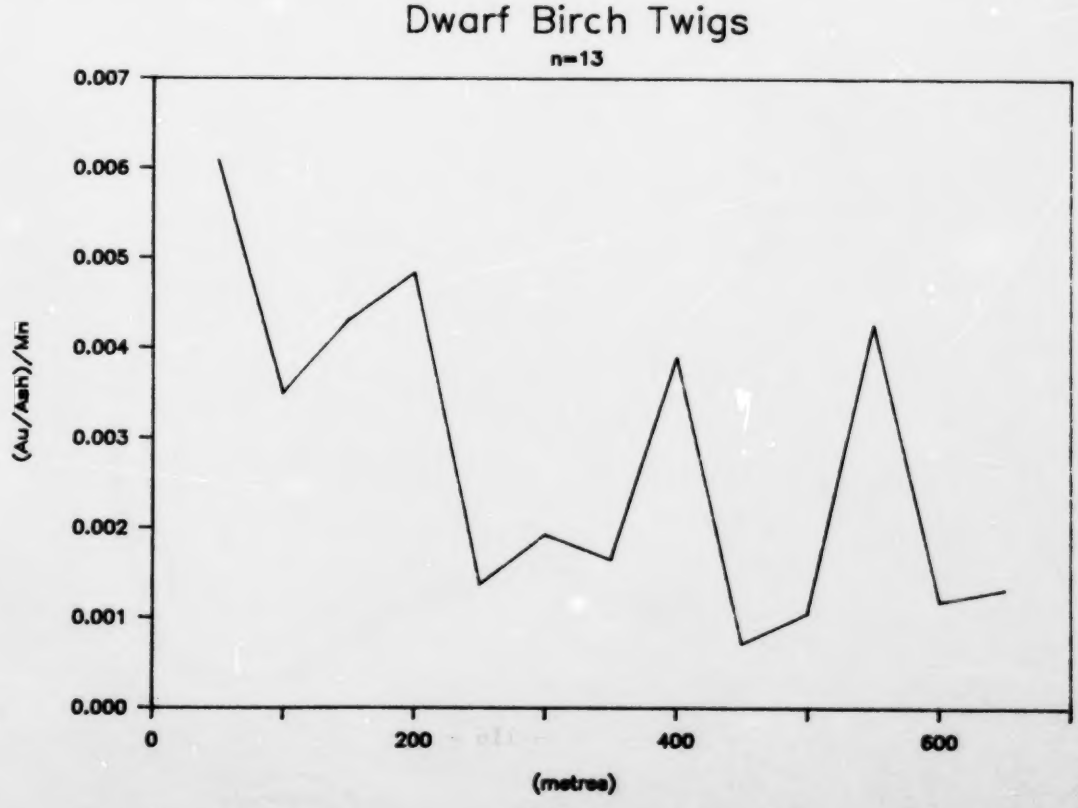

Dwarf Birch Twigs
n=13
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
(Ni/Ash)/Ba
0
200
400
600
(metres)

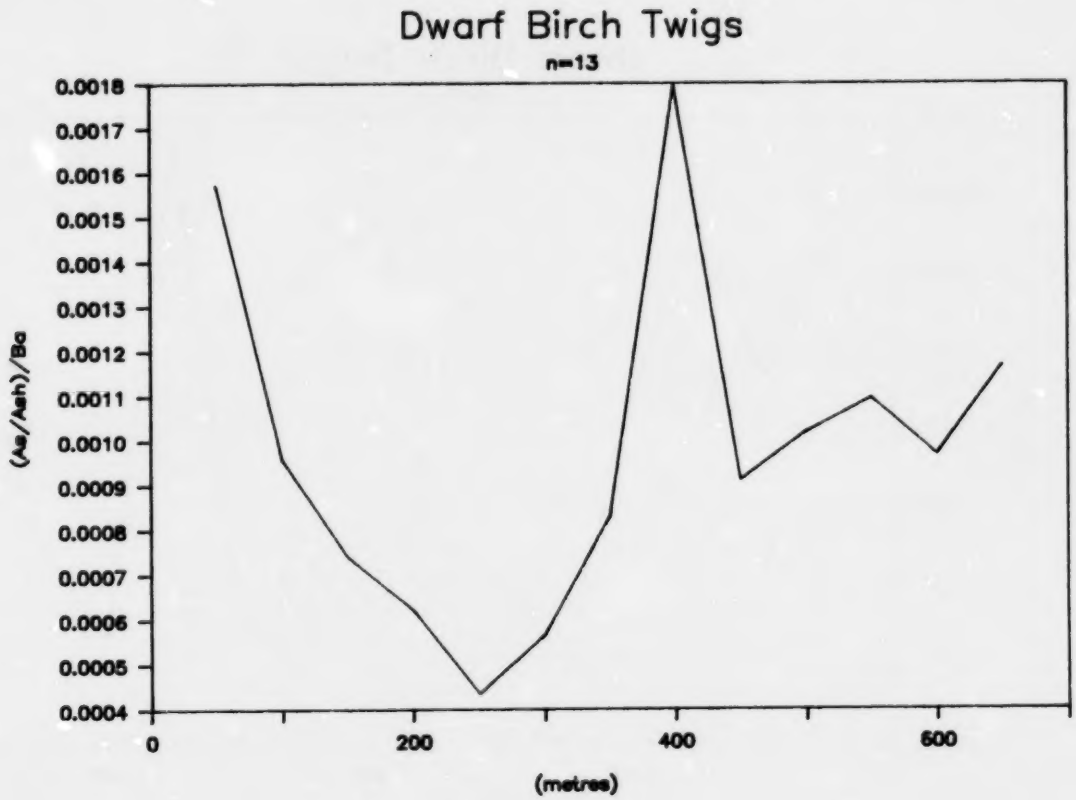

Dwarf Birch Twigs
n=13
0.030
0.029
0.028
0.027
0.026
0.025
0.024
0.023
0.022
0.021
0.020
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.010
0.009
0.008
(Cu/Ash)/Ba
0
200
400
600
(metres)


Dwarf Birch Twigs
n=13
(Fe/Ash)/Ba
40
35
30
25
20
15
10
5
0
0
200
400
600
(metres)


Dwarf Birch Twigs
n=13
(Co/Ash)/Ba
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
0
200
400
600
(metres)


Dwarf Birch Twigs
n=13
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
Au/Ba
0
200
400
600
(metres)


Dwarf Birch Twigs
n=13
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
(Au/Ash)/Mn
0
200
400
600
(metres)


Dwarf Birch Twigs
n=13
(As/Ash)/Ba
0.0018
0.0017
0.0016
0.0015
0.0014
0.0013
0.0012
0.0011
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0
200
400
600
(metres)